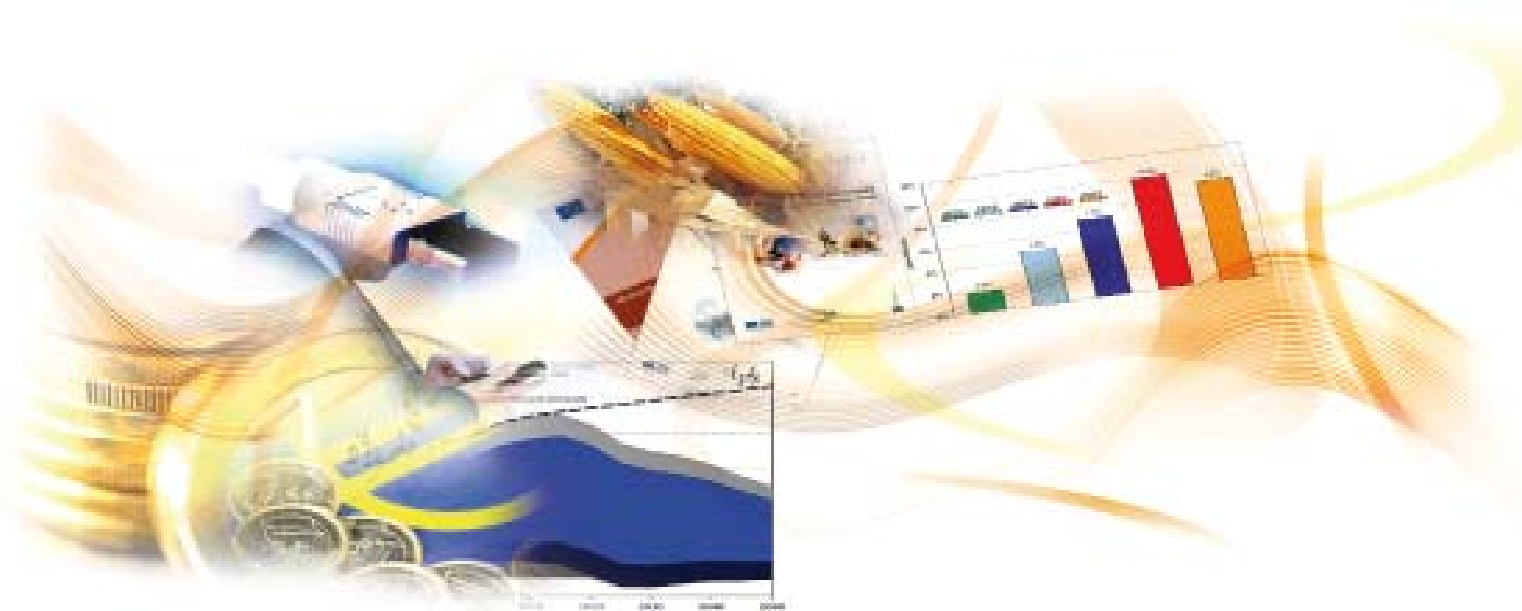


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The influence of the Common Agricultural Policy on agricultural landscapes

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2012



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Abstract

Agriculture is both a large-scale user of land and a provider of landscapes. The adaptation of agricultural practices to local conditions has led to a wide variety of "cultural landscapes" in Europe. The Common Agricultural Policy is a major driver of land use and changes in farming practices in Europe, and thus also affects landscapes. The report analyzes how the CAP's design and implementation have influenced agricultural landscapes. It provides a catalogue of the CAP measures that have been put in place and are currently influencing landscapes, as well as the expected effects derived from the proposal for the post-2013 CAP. It differentiates between pillar 1 and pillar 2, and between measures with a direct focus on landscapes vs. non-targeted measures which also have the potential to influence landscapes (positively or negatively). The olive and livestock sectors, where the influence of the CAP on landscape is of particular interest, are also analyzed. By providing a list of the potential influences of the CAP on the landscape elements and structures valued by EU citizens, this report provides a knowledge base to support an effective CAP policy design in the direction of improved landscape management, an important component of the EU project towards a more sustainable agriculture.

Keywords: CAP, agricultural landscapes, rural development, policy evaluation, olive, livestock

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The authors are solely responsible for the content of the paper. The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

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Introduction

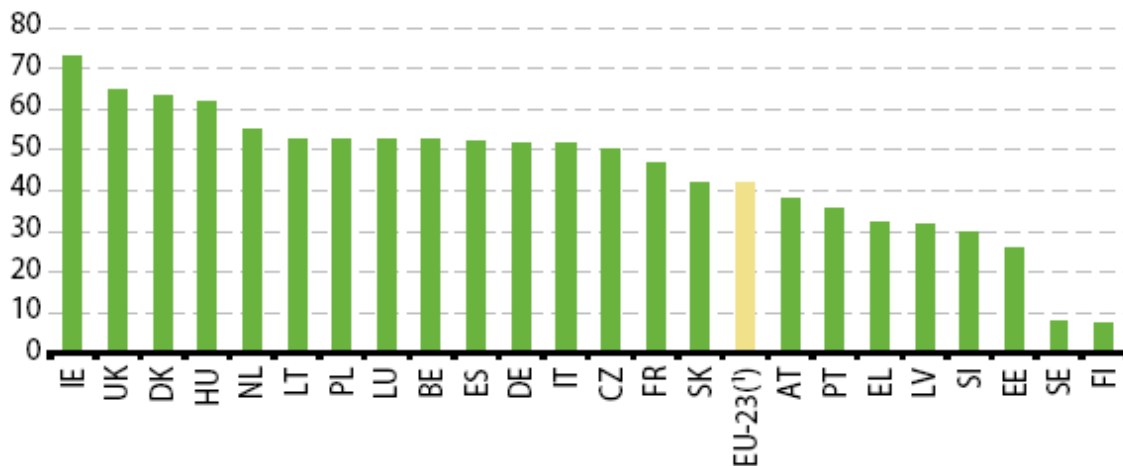
European landscapes are shaped by agriculture, a millennia-old activity in Europe. Over several centuries, agriculture has transformed what in most parts of Europe was a wooded climax natural vegetation to open landscapes, and, over time, many of these man-made agricultural landscapes have become highly appreciated in their own right (Cooper, Hart et al. 2009). The adaptation of agricultural practices to local climatic and geographic conditions has led to a wide variety of "cultural landscapes". A cultural landscape is a "natural landscape" where a group has established its own human organization of space and time (Sauer 1963; Jackson 1984). Agricultural landscapes range from almost entirely man-made and intensively managed polders in the Netherlands to semi-natural extensive grazing areas in the high Alps. Nowadays, despite the low share of agricultural production in total economic production, agriculture remains the main land use in Europe. In 2007 the total utilised agricultural area (UAA) covered 160 million hectares in the EU-27, representing 42% of the whole EU territorial area (FSS 2007), with large variations between countries (Figure 1). Satellite images of land cover also show the predominance of agricultural land cover and the diversity at EU level (Figure 2).¹

Agriculture is both a large-scale user of land and a provider of landscapes. Of all the environmental public goods provided by farming, landscape is probably the most difficult to describe due to the complexity of the concept and the overlap with other public goods. Agricultural landscape is considered as a public good per se (for its aesthetical, recreational and cultural value) but also as the ecological infrastructure necessary for the existence of other public goods such as biodiversity, water and soil quality. There is a vast literature on landscape definition that highlights its multidimensional character (Madureira and Lima Santos 2012). Moran (2005) defines landscape as "an assemblage of physical attributes that is viewed by people". These attributes include landform (mountain/plain), geology, vegetation (crops/forest/pasture), water, colour, adjacent scenery etc. But landscape is also an interaction between nature and culture. The role of human factors is underlined in the definition from the European Landscape Convention (2004): landscape is defined as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors".²

¹ While land cover indicates the visible surface of land (e.g. crops, grass, water, broad-leaved forest or built-up area), land use indicates the socio-economic purpose for which land is used (e.g. agriculture, forestry, recreation or residential use). Both data are useful to analyze landscapes.

² The European Landscape Convention promotes the protection, management and planning of European landscapes and organises European co-operation on landscape issues. The convention was adopted on 20 October 2000 in Florence (Italy) and came into force on 1 March 2004 (Council of Europe 2000). It has been signed by 37 of the 47 Member States of the Council of Europe. It is open to all European countries, EU Member States and others, as well as the European Commission itself. It is the first international treaty to be exclusively concerned with all dimensions of European landscape.

Figure 1: Share of agriculture in total land use (%)

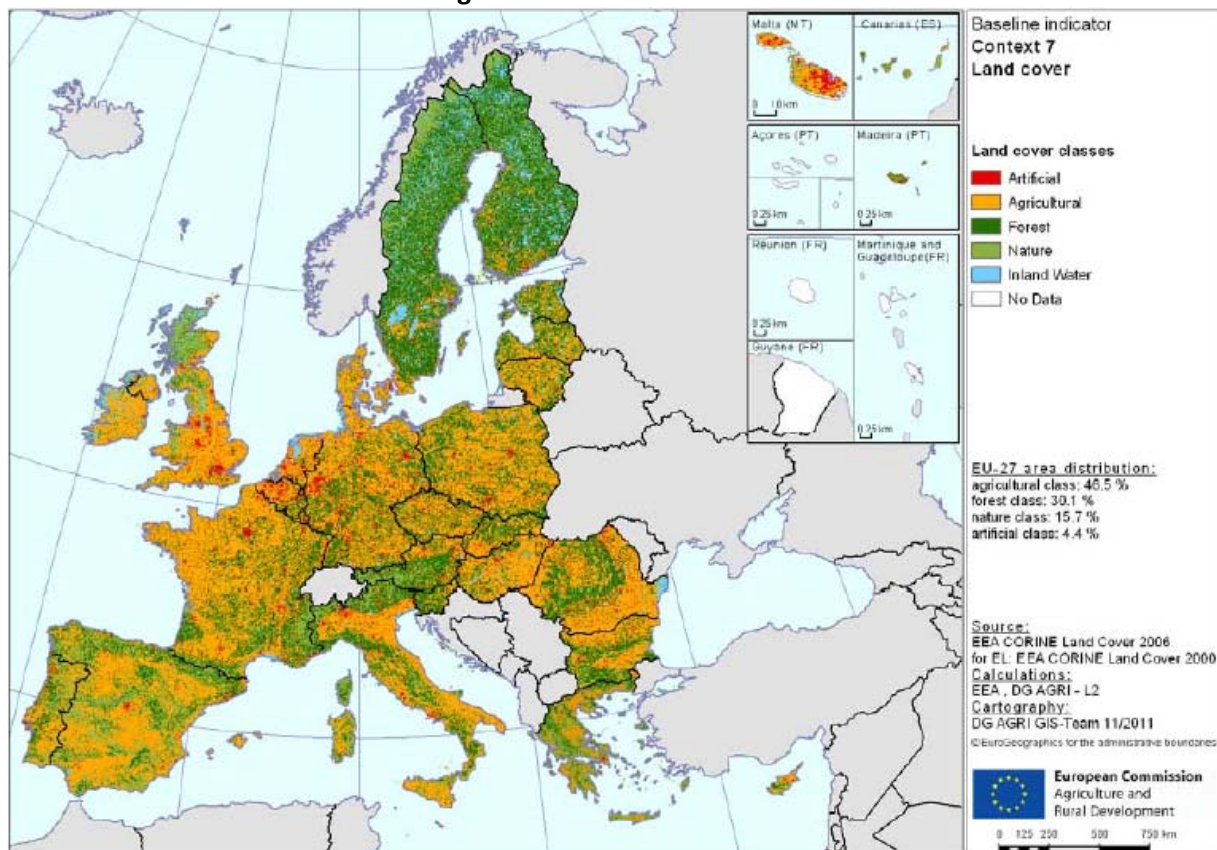


(!) BG, RO, CY and MT not included in the LUCAS 2009 survey.

AT: Austria	EL: Greece	IT: Italy	PT: Portugal
BE: Belgium	ES: Spain	LT: Lithuania	SE: Sweden
DE: Germany	FI: Finland	LU: Luxembourg	SI: Slovenia
DK: Denmark	FR: France	LV: Latvia	SK: Slovakia
CZ: Czech Republic	HU: Hungary	NL: Netherlands	UK: Unites Kingdom
EE: Estonia	IE: Ireland	PL: Poland	

Source: LUCAS survey 2009 (EUROSTAT 2011)

Figure 2: Land cover in EU 27



Source: (European Union Directorate-General for Agriculture and Rural Development 2011)

Note: The data source used is CORINE Land Cover (CLC). CLC databases are obtained through computer assisted interpretation of satellite images.

Not all agricultural landscapes in the EU are valued as desirable public goods (Cooper, Hart et al. 2009). Why is it that certain landscapes appeal to us? What do humans appreciate in landscapes? Landscape quality is difficult to define and there is no consensus within the scientific community (Otero Pastor, Mancebo Quintana et al. 2007). From a landscape management point of view, the concept of quality refers to diversity, coherence and continuity (Kuiper 1998). Arriaza et al. (2004) assume that quality is related to the visual characteristics of the landscape: variety of colours, organization of different land cover types, plot size, fragmentation, diversity of elevations, pattern types. Lee et al. (1999) define quality as the ecological value of the landscape. Otero Pastor et al. (2007) consider the term quality to refer to the concept of naturalness; in this context, a landscape has a high quality value when no human influence is visible. Paracchini and Capitani (2011) also consider the hemeroby index, i.e. how much the actual agricultural ecosystems differ from a potential natural one, as a component of landscape indicator. Lothian (2000) reviews and summarizes the available evidence on how humans perceive landscape quality. His work is based on various theoretical constructs such as the contribution of philosophers to aesthetics, the psychology of perception and colours, the psychoanalytical construct of human responses to aesthetics, and the influence of culture on landscape preferences.

Another difficulty comes from the fact that the links between rural landscapes and farming practices are complex. The scale of landscape public good provision is influenced by diverse characteristics of the farming systems such as: i) Land use and crop cover; ii) Practice applied (inputs, crops and livestock selected, machinery employed) iii) Farm size and structure (field size and scale of operation); iv) Location factors (farm location in relation to water courses, groundwater resources, forest, or the presence of relic landscape elements and archaeological features for example); v) socio-economic structures (semi-subsistence farming versus large industrial farms) (Cooper et al. 2009). On the one hand, thanks to the diversity of farming systems, agriculture has contributed over the centuries to the creation of a rich diversity of habitats and landscapes. On the other hand, inappropriate agricultural practices and land use have also had adverse effects on landscape and the ecosystem services they provide. With technological development and the evolution of demand for food, structural changes in agriculture in the second half of the twentieth century have led to increased intensification, concentration and specialization of production in some areas and marginalization and abandonment in others, leading to significant changes in the farmed landscapes. Certain landscapes have been intensified and denuded of more natural features through, for example, large-scale specialization or mono-cropping, widespread production under glass or plastic or the introduction of exotic plantations. All these transformations can seriously influence a landscape's ecological, aesthetic and socio-cultural character (Cooper, Hart et al. 2009). While farmers had historically provided environmental and landscape amenity benefits for free, these changes have undermined the apparently complementary relationship between agriculture and rural environment.

Such processes were accelerated by the entry into force of the Common Agricultural Policy (CAP) with the treaty of Rome in 1957. The priority at that time was to increase agricultural productivity in order to ensure farmers a satisfactory and equitable standard of living, and to stabilize agricultural markets and farmers' income. In the first 20 years of its history, the CAP remained almost completely divorced from environmental and landscape considerations (Vanslembrouck and VanHuylenbroeck 2005). The need for a greater degree of integration of environment in the agricultural policy gradually became evident in the 1980s. With the MacSharry 1992 reform, environmental protection became a concern of the CAP, in agreement with the general EU policy of integrating environmental concerns in all policies (following Rio Earth summit in 1992). Under the agri-environmental regulation 2078/92, aid was made available to reduce agro-chemical inputs, to assist organic farming, to facilitate shifts to extensive forms of production or grassland management and to support production methods that protect the environment and maintain the countryside. The multi-

functionality of agriculture was recognized by the Agenda 2000 reform (implemented in 1999): agriculture produces commodities, but also landscapes, balanced land use, jobs, and a quality environment. A new policy for rural development was developed, which became the second pillar of the CAP. The policy became better anchored in 2007 with the creation of the EAFRD (European Agricultural Fund for Rural Development). The Community Strategic Guidelines for Rural Development state that resources devoted to Axis 2 should contribute to the “preservation and development of high nature value farming and forestry systems and traditional agricultural landscapes” (Council Decision 2006/144/EC). The new CAP legal proposal on Rural Development (2011/0280 (COD) and 2011/0282 (COD)) establishes a Union sub-priority on restoring and preserving the State of European Landscapes. During these different periods, the CAP has impacted on farming systems and land use and therefore has had a non-negligible influence on rural landscapes.

This report raises an important issue related to the external effects of the CAP on European landscapes. We use the concept of “external effect” here because these effects do not belong to the set of objectives of the CAP and because the CAP cannot be considered a landscape policy. Rather, the CAP provides incentives to modify land use and farming practices, which in turn have an influence on rural landscapes. For readers unfamiliar with the CAP, a summary of the measures currently in place (2007-2013) and the proposal for 2013-2020 are available in Table 1.

The CAP is often put forward as being the principal driver of changes in land use and farming practices in Europe. Whilst there is strong evidence in support of this statement, we must not forget that there are many other “*global*” drivers of land use change that may have played an important role in shaping rural landscapes. Obviously the CAP is not the only factor to influence farming and therefore affecting landscape in the EU Member States (MS). Socio-economic and technological changes also play a fundamental role, making it difficult to establish the causality and relationship between the CAP, its impact on farming systems and the influence on landscape. It is probable, for example, that land use change would have occurred in the absence of the CAP, although it is difficult to say whether these changes would be similar or completely different to those we have observed over the past 50 years. Because the CAP has been in place during the most widespread and rapid changes of the rural environment in the whole of European history, it would be naïve to lay all the responsibility for the transformation of rural landscape at the feet of the CAP (Brouwer and Lowe 2000). The CAP has interacted with all these evolutions in rural areas, and these evolutions would have had profound consequences without the CAP. The contention that the CAP is the major driver of land use and farming practices' change may not be straightforward.

Moreover, policies can have effects over different timeframes, depending on their interaction with previous policies and how agricultural practices and natural elements respond to policies (Chassany and Miclet 2005). While individual preferences and collective norms towards landscape evolve over time, the socio-ecological process of landscape change follows its own path, and it is often impossible to immediately streamline the new social norms with the current state of the landscape (Lifran 2009). If the political, economic and social environment are important drivers of landscapes' transformation, the chronology embodied in landscapes should not be underestimated (Widgren 2012). This relates to what Dodgshon calls the synchronic illusion: we tend to “experience the past as if it were synchronic when in fact, it is richly diachronic” (Dodgshon 1998). All the changes in land use are incorporated into subsequent landscapes, and they tend to survive in different social and political contexts. Each landscape is a result of the superposition of different layers of changes that have occurred at very different points in time.

We summarize in Figure 3 the other factors interacting with the CAP that act as drivers of rural landscape evolution. First, the CAP interacts with other policies (either at EU, national or local level). Secondly, not all farmers react to the incentives provided by the policies in the same way. Their

reactions usually depend on their characteristics and preferences, as well as their farm structure. Lastly, other external drivers such as regional development, world demand for agricultural commodities and climate are likely to provoke a transformation of rural landscapes, and to impact on the influence farmers have on rural landscapes. The exercise performed in this report does not enable us to disentangle the CAP's own effect from that of other drivers, given their multiplicity and the complexity of the interactions. To avoid the association of a direct causal effect where there is no evidence of it, we use the terminology « influence » of the CAP, rather than "impact" or "effect".

Motivations

Considering the importance of the budget devoted to the CAP, on one side, and the importance of European landscape diversity for the tourism industry and also for the well-being of European populations, on the other, research on the influence of the Common Agricultural Policy on agricultural landscapes is crucial in order to support policy makers. This research is particularly important as it is in line with the timeframe for the discussion of the proposal of the CAP post-2013. More precisely, the motivations for this study are the following:

First, not only does the CAP represent a significant proportion of EU budget expenditure (41% of the EU's total budget in 2011, EUR 55 billion per year), but it is also the most important funding instrument for agriculture at EU level.³ Given that it influences the management of the majority of agricultural land, it has the potential to encourage the delivery of landscape public goods on a European scale. For example, it should be taken into account that further intensification in EU-12 is likely to exert the greatest pressures on the landscapes because there is still considerable scope for further farm investment, restructuring and technological improvement in these eastern European countries. This will have a substantial influence on the countryside as many of Europe's traditional landscapes remain in these regions, as a result of their lower intensity farming (Poláková, Tucker et al. 2011). In addition, the CAP is due to be reformed by 2013 and therefore any evaluation of the current policy is of interest in order to improve it and derived proposals. For example, greening or the suppression of milk quotas are expected to influence land use and associated rural landscapes (Colman 2002; Alliance environnement 2008; PBL 2012). The knowledge of the extent to which CAP can or has up to now influenced landscapes is useful to redesign the policy. Similar exercises have been realized recently on the role of the CAP in addressing biodiversity and habitat preservation (Poláková, Tucker et al. 2011), and on the use and efficiency of public support measures (including the CAP) on addressing organic farming (Sanders, Stolze et al. 2012), or on entry-level agri-environmental schemes (Institute for European Environmental Policy 2011).⁴ The report fills the gap in the literature on the topic. It includes the few direct references in the literature on the influence of the CAP on landscapes. When evidence is available on the impact of a measure only on other dimensions such as habitat, land use and so on, the report infers what the potential impacts on landscapes could be.

Second, there is a political disagreement over the right level of governance for rural policy in general, and landscape protection in particular (Chambon and Tomalino 2009). The first school of thought argues in favour of essentially local governance because landscape public goods generally do not spill across borders. Most of the benefits of diverse, traditional, well-kept landscapes will be reaped

³ European Commission Financial Programming and Budget
http://ec.europa.eu/budget/explained/myths/myths_en.cfm#9of15

⁴ The IEEP (2012) study is concerned with the content, structure and design of entry-level agri-environment support and it does not attempt to measure or evaluate the environmental impact of that support. The scope of the study excludes higher-level agri-environment management, such as the creation or restoration of landscape features and habitats, and the conservation of genetic diversity; it also excludes organic farming and integrated production because these involve changes in the whole farming system.

within the country –as an advantage to attract qualified human resources and tourists- and should therefore be managed at Member State level. The second school of thought acknowledges the existence of European public goods in rural areas and the legitimacy of the cohesion principle. While the expert declaration "A Common Agricultural Policy for European Public Goods" (2009) singles out the fight against climate change, the protection of biodiversity, and water management (avoiding pollution, scarcity and floods) as genuinely European challenges, the proponents of EU financing for landscape protection tend to define European public goods more broadly. One argument is that landscapes have an existence value for all European citizens, even if the use value only benefits local people. Each individual landscape is a local public good but landscape diversity is a public good that should be provided at EU level. They also argue that, while the principle of subsidiarity is desirable, in practice its application would diminish environmental expenditures (Westhoek, van Zeijts et al. 2012). Investigating to what extent the CAP can or has up to now influenced landscapes can help to determine whether the subsidiarity principle should apply to landscape management or not.

Third, while the right level of governance for landscape policy is open to debate, we know that this policy is meaningful as society positively values agricultural landscape. Since the beginning of the CAP, rural populations have decreased dramatically and agriculture has been profoundly transformed, both in its structure and technology, and naturally, in its relationship to space and rural landscape. But the urban population has growing expectations of agriculture: beside food production, rural areas are valued for their offer of recreational activities and aesthetic values. According to a recent survey, 86% of the respondents agree that agriculture contributes to the beauty of the countryside and 89% believe that agriculture helps to protect rural areas (Eurobarometer 2012). Ciaian and Gomez y Paloma (2011) have developed a meta-analysis to estimate the willingness to pay (WTP) of citizens for EU agricultural landscapes. They found that the estimated per hectare average value of EU agricultural landscape is 149 Euros/ha in 2009. Furthermore, their calculations indicate that the total value of EU landscape in 2009 is estimated to be Euros27.1 billion, representing around 8% of the total value of EU agricultural production and roughly half of the CAP expenditures.⁵ Because landscape support derived from the different public policies should reflect the value society attaches to it, it is interesting to have a measure of the importance of landscapes' conservation objectives in the CAP.

With this background in mind, the report aims to analyze how the CAP design and implementation have influenced agricultural landscapes. It provides a catalogue of the CAP measures with a direct focus on landscapes, as well as the non-targeted measures which have the potential to have a positive (or negative) influence on agricultural landscapes.

The report is structured as follows. We first present how the different measures of the CAP have been and are currently influencing landscapes, differentiating between pillar 1 and pillar 2 measures, and the expected effects derived from the proposal for the post-2013 CAP. Then we analyze in detail two sectors (olive production and livestock) where the influence of CAP on landscape is of particular interest.

What is inside and what is outside the scope of the report?

We focus on the influences on the visual aspects of landscapes, i.e. landscape structures and elements. Landscape elements include land cover categories and man-made elements such as walls,

⁵ The value of agricultural landscape as estimated in their paper is lower than the present CAP support level, but it only accounts for landscape public good. Accounting for the complete set of agricultural public goods, the overall non-market benefit of agricultural landscape might be larger. These numbers should be taken with caution as the methodology of meta-analysis is controversial. A common criticism of meta-analysis is that researchers combine different kinds of studies ("mixing apples and oranges") in the same analysis. Therefore, the summary effect will possibly ignore important differences across studies .

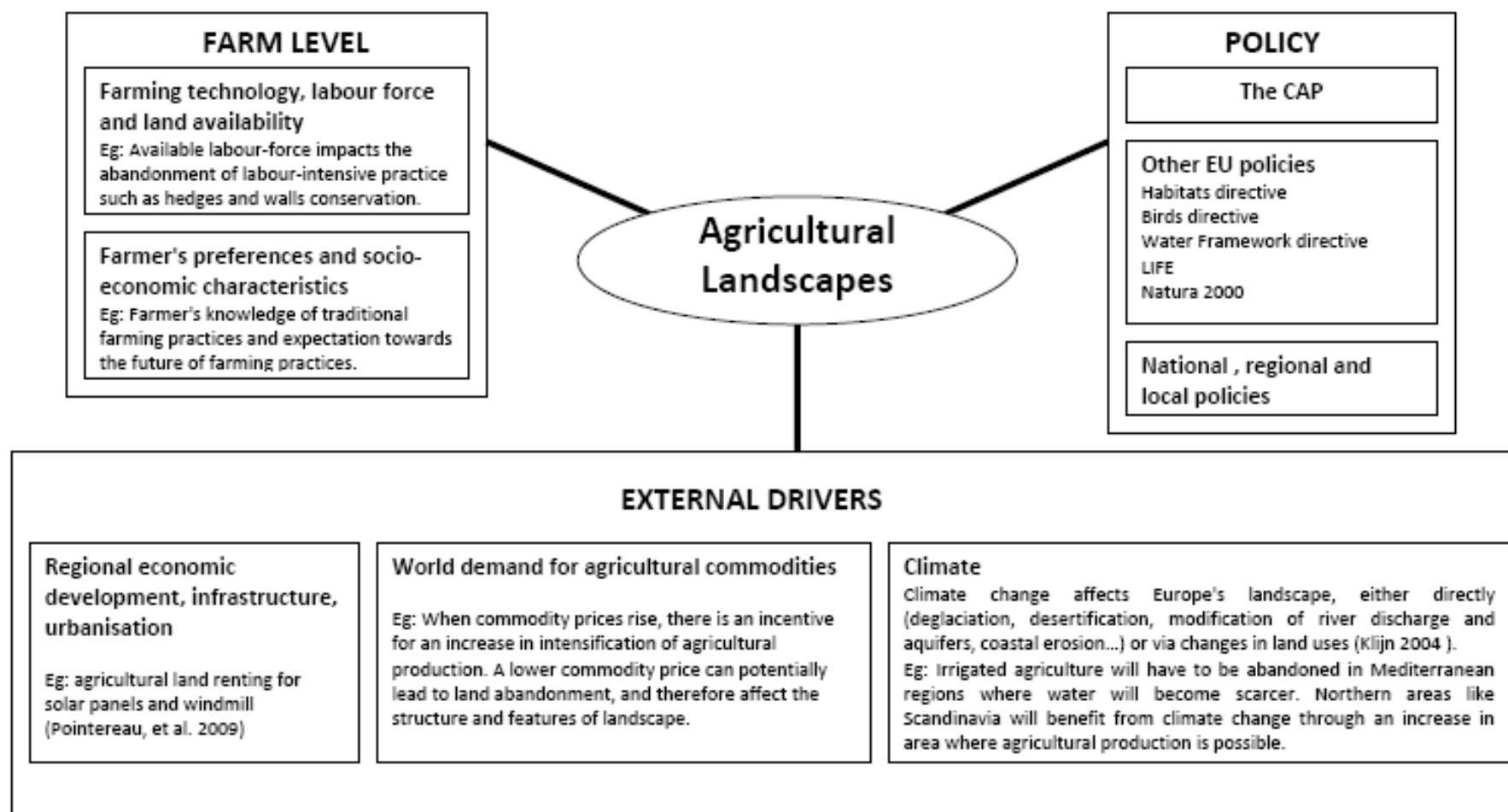
hedgerows or irrigation infrastructure. The structure of landscapes is the composition and configuration of landscape elements. Landscape cannot be defined by itemising its parts, because they are subsidiary clues to an integrated image (Tuan 1979). Composition refers to the number and occurrence of different types of landscape elements, while configuration encompasses the physical distribution or spatial character within a landscape (McGarigal and Marks 1994). The spatial configuration and composition of landscape elements determines, to a great extent, the services provided by landscapes such as food provision, carbon sequestration and storage, waste-water treatment, erosion prevention, pollination, biological control, habitat for biodiversity, tourism, aesthetic appreciation and inspiration for culture, art and design (Millennium Ecosystem Assessment 2005). However, how the CAP influences the provision of these services by landscape is outside the scope of this report. Indeed, it is difficult to distinguish between landscape values and the values of the various ecosystems services provided by environmental assets (2007). In other words, it is difficult to distinguish "what a landscape is from what a landscape does" (2005). Table 9 in the annex describes the relationship between landscape structures and elements and landscape services.

Landscapes have a physical reality independent of people. But they also have a reality that depends on human perception (Palmer and Hoffman 2001). While it is possible to describe how landscapes evolve in reaction to different drivers, it is difficult to evaluate the quality of these changes as it will depend on each individual's perception. Beauty and other perceptions are "in the eye of the beholder" (Palmer and Hoffman 2001). According to Lifran (2009), the aesthetic satisfaction relies on three values: the sense of order (how parts fit together), the need to be able to recognize, explain and identify (congruence, transparency and legibility) and the need for spatial orientation (presence of landmarks). Another study described similar and complementary attributes. People value landscapes which: i) are recognisable for their distinctive features, ii) are diverse: contain many layers, both visual and cultural, iii) provide a sense of peace and calm and lack intrusion such as newly built developments, iv) are accessible: providing the ability to experience the landscape either physically or visually, v) contain nature in the form of wild species and habitats. People's perceptions of landscape quality also depend on their connection to the place and their understanding of its history and function. For instance, a farmer may perceive the landscape where he has his livelihood in a very different way to a visitor who comes on holiday (Deane 2011). The relative importance of these different aspects will vary across people making the evaluation of an average landscape quality difficult and potentially meaningless. The report focuses on the description of the changes in visual aspects.

The evidence draws on a wide range of secondary sources, including scientific literature, evaluation studies and analysis of the policy framework. We illustrate the report with both photos and paintings. The use of these two supports enables us to illustrate the consequences of farming practices on the visual aspect of certain agricultural landscapes. Of course, each illustration represents a specific view at a specific site and therefore does not represent the overall landscape. Photos capture the landscapes as they can be seen, while paintings capture the perception of a representative/valuable agricultural landscape.⁶ The report focuses on the influences on the visual/physical aspects of landscapes, and avoids the difficult exercise of evaluating the value of these changes for the population, whereas illustrations permit a step in that direction by capturing the perception of the painter or photographer.

⁶ As argued by Emilio Sereni (1961), who chose iconographic evidence - among other things - to illustrate his book on the History of Italian agricultural landscapes, "a literary or artistic testimony can [be] assume[d] for its ability to express the "typical", a representative value that would otherwise be sought only in the severe probability of statistical analysis".

Figure 3: Various drivers of the evolution of agricultural landscapes



Source: authors' own elaboration

Table 1: Summary of CAP measures 2007-2013 and proposal for 2013-2020

		CAP 2007-2013	CAP 2013-2020 (COD) 2011/0280, 2011/0282
P I L L A R I	Direct payments	Decoupled payments: Single Payment Scheme + Simplified Area Payment Scheme Coupled payments (article 68) All payments subject to cross compliance	New design of direct payments - Basic payment scheme - 'Green' payment (30% envelope for the farmers who respect the requirements in terms of: Crop diversification, Permanent grassland, Ecological focus area) - Young farmers scheme - Coupled support (voluntary, MS choice) - Support in natural constraint areas (voluntary, MS choice) OR simplified scheme for small farmers All payments subject to cross compliance All farmers will have access to the Farm Advisory System Capping of payments
	Market support	Single market Organization Promotion of EU farm products Export refund School Fruit and Milk Schemes	Support for a better food supply chain End of certain aid schemes (Skimmed Milk Powder, hops and silkworms) End of production quotas (sugar) Enhanced safety-net: More flexibility and greater coherence in exceptional measures + Simplified and more responsive to crises public intervention/private storage Export refunds and tariffs maintained Increased funding for School Fruit and Milk Schemes
P I L L A R II	Rural development	46 measures in 3 Axis Axis 1: competitiveness Axis 2: environment Axis 3: rural life and diversification	20 actions for 6 priorities 1. Fostering knowledge transfer and innovation 2. Enhancing competitiveness 3. Promoting food chain organisation and risk management 4. Restoring, preserving and enhancing ecosystems 5. Promoting resource efficiency & transition to low carbon economy 6. Promoting social inclusion, poverty reduction and economic development in rural areas

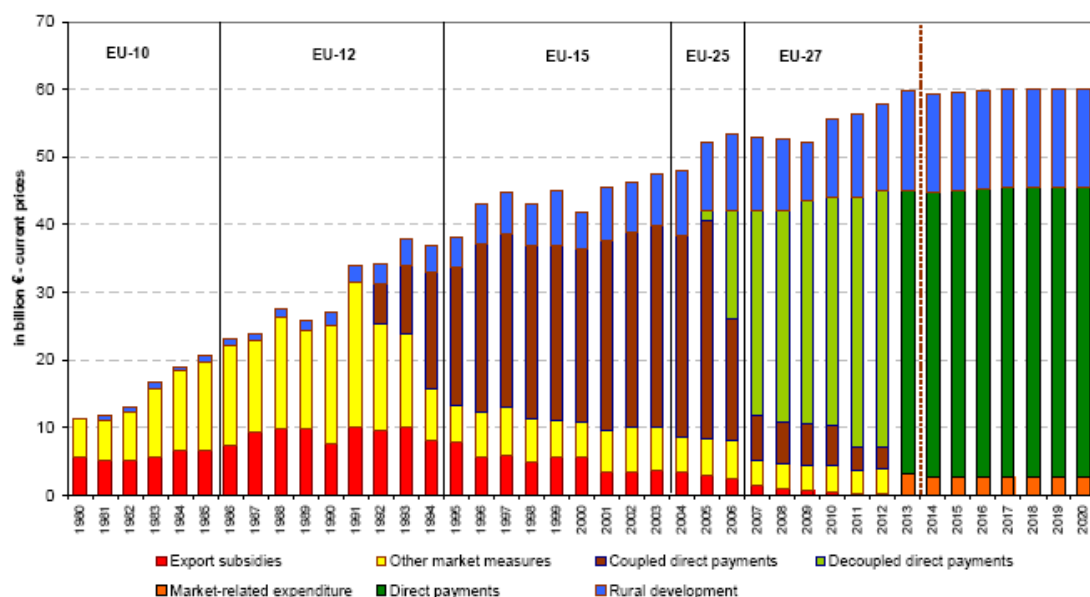
Source: authors' own elaboration

Part I: CAP measures and their potential influence on agricultural landscapes

In this section the influence of the CAP on landscape is described. The CAP is divided into pillar 1 and pillar 2 measures due to the current division of the CAP. Pillar 1 measures are related to direct payments to farmers and market management measures while pillar 2 measures are related to Rural Development Policy. Therefore, while pillar 1 measures are not directly targeting landscape provision, they are influencing land use changes. On the contrary, pillar 2 includes measures with a direct focus on conserving/creating/managing landscape (considered a public good). They are designed to enhance the conservation of cultural landscapes and the potential benefits derived from it.

The CAP can influence landscape and land use changes through the budget structure and the design of the different instruments. As shown in Figure 4, pillar I dominates the CAP budget, with a budget close to four times the size of that of pillar II in the last programming period 2007-2013. However, the proportion of funds allocated to pillar II has increased significantly over the past decade.

Figure 4: Evolution of CAP expenditures



Source: DG Agriculture and Rural Development

Notes:

2011 = Budget; 2012 = Draft Budget;

2013 = EAGF subceiling for direct payments and market-related expenditure + pillar 2 in commitments.

Rural development for 2013 includes UK voluntary modulation and Article 136 "unspent amounts". As these cease to exist end 2013, the corresponding amounts are put back to direct aids as from 2014.

1. Pillar I: Direct payments and their influence on land use

1.1) From coupled to decoupled payments: influences on landscapes

Description of the measure

The CAP market regime was historically based on price support. From 1992, support had the form of coupled compensatory direct payments. Product-specific measures also include the establishment of minimum price levels and quotas for certain farm products (e.g. milk quotas and minimum prices for butter and skimmed milk powder) in order to encourage farmers to continue food production. The 2003 CAP reform constituted a fundamental change in the instruments applied in the CAP, with a switch from coupled income supports to a single decoupled support (Council Regulation (EC) No 1782/2003). Full decoupling was effective in 2010.

The system of direct support, under which aid is no longer linked to production (decoupling), is known in the EU-15 as the Single Payment Scheme (SPS). Member States can choose from three basic SPS models when calculating the reference amount for an individual farm: decoupling based on historical farm patterns of production, decoupling based on regional historical patterns of production and hybrid systems. Under the historic model, each farmer's SPS entitlement is calculated on the basis of the livestock herd size or crop area in the reference years (as a general rule 2000, 2001 and 2002). Under the regional flat-rate model, the total amount of payments under the relevant pillar 1 regimes paid in a given region in the reference years is converted into an average amount of entitlement per hectare of eligible farmland. In EU-12, the direct payment system is simplified (SAPS, Single Area Payment Scheme). Payments are on a flat-rate basis per hectare of farmland for each Member State, within a national budget ceiling. In most Member States, SPS entitlement rights can be traded and claimed on different land to that which justified the support in the first place. The amount of SPS (and SAPS) paid per hectare of farmland can vary enormously, depending on the CAP implementation in the reference years.

Due to fears that decoupling of payments could lead to the abandonment of production in some sectors, Member States have the option to implement certain coupled payments alongside the SPS (and SAPS). Under Article 69 of Regulation 1782/2003 (now replaced by Article 68 of Regulation 73/2009), support can remain coupled in particular sectors, which have been assessed as sensitive for example for environmental, social or economic reasons, and/or for which a transitional period has been necessary before full decoupling. In order to comply with WTO Green Box conditions, support for a number of these purposes is limited to 3.5% of national ceilings. Article 68 can also be used to fund agri-environmental type measures beyond those included within pillar 2 (article 68 (1)(a)(v)). In these circumstances, up to 10% of the national ceiling can be used.

Influence on landscapes

Coupled payments and market support give incentives to farmers to grow the supported crops, and can therefore potentially lead to a reduction in crop diversity and rotation at farm level (Centre d'Analyse Stratégique 2011). The associated homogenisation of agricultural landscape is perceived as a reduction of its visual beauty, due mainly to the lack of colour variety (Arriaza et al (2004)) as shown in Illustration 1.

Illustration 1: Monoculture

Oilseed rape © Andrew Fogg



Wheatfield, Rhineland-Palatinate Germany Horst
© Juergen Scheib, ENRD 2012



However, at regional level, Maillard et al. (2000) found that CAP support did not lead to a concentration of production in the more productive regions (in the period 1983-1995). They showed that the repartition of cereal and beef production, supported by quotas and minimum prices, remained mostly unchanged in the European Union. Indeed, thanks to CAP support, production can be maintained in regions with "natural handicaps". In these regions, non-supported production is replaced by supported production. As a result, production of less supported commodities such as pigs and poultry became concentrated in the more competitive regions. Fruit and vegetable production however did not but was displaced to a few regions. The Netherlands and South of Spain produced 21% of European fruit and vegetable output in 1995 compared to 15% in 1983.

Production or plantation quotas certainly had a great influence in stabilizing production in some regions. For example, because they were often managed by local plants, milk quotas have supported dairy cattle maintenance in less favoured areas. The suppression of the milk quota, driven by market efficiency considerations, could speed up the disappearance of dairy cattle in several areas of bocage where cattle previously contributed to the landscapes' maintenance (Alliance environnement 2008).

The introduction of decoupled payments was supposed to reduce the interactions between CAP support and farmers' production decisions, and as a consequence increase the role of market forces as a driver in farmers' decisions. Therefore, a reduction in the influence of agricultural payments on agricultural landscapes was expected. But due to the fact that decoupled direct payments (as well as coupled support) stabilise farm income, they help to maintain farming and therefore contribute to the preservation of farmed landscapes. Brady et al. (2009) found that decoupling has small influences on the landscape mosaic in relatively productive regions, since land use remains largely unchanged. However, in marginal agricultural regions, decoupling was shown to have a negative influence because of the homogenisation of land use that results from land being taken out of

production. Indeed, because farmers can receive payments without producing, the SFP scheme has contributed to reduce agricultural production and lead to abandonment in some cases.

One limitation of decoupled payments to support cultural landscapes' conservation is that payments are not specifically targeted at those farms that are more economically vulnerable and those that deliver the most positive environmental public goods (including landscape). Indeed, the current historic model for payment calculations (based on historic production) means that the majority of payments are concentrated in the most productive regions, with intensive farming practices. Therefore, it is not obvious that decoupled payments contribute to maintain landscapes with high aesthetic value (Cooper, Hart et al. 2009). Reger et al. (2009) have modelled the potential effects of three alternative transfer payment schemes on the farmland habitat diversity in a marginal European landscape, characterized by unfavourable agricultural structures and poor topographic, edaphic, and climatic conditions for modern agriculture: (1) a scenario with direct transfer payments coupled to production, (2) a scenario with direct transfer payments decoupled from production, and (3) a scenario phasing out all direct transfer payments. They found that all scenarios predicted a general trend of homogenization of the farmland habitat pattern (richness, evenness, and rarity), compared to the reference year 1995, yet to a differing extent. Transfer payments coupled to production (Scenario 1) favoured the abandonment of agricultural production, particularly in less productive areas and arable land use in more productive areas. Habitat richness and habitat evenness had intermediate values in this scenario. Decoupling transfer payments from production (Scenario 2) supported grassland as the most profitable farming system. This led to a grassland-dominated landscape with low values of all habitat diversity indices. Phasing out transfer payments (Scenario 3) resulted in the complete abandonment or afforestation of agricultural land and extremely low values in all habitat diversity indices. They conclude that transfer payments may prevent the abandonment of agricultural production, but may not counteract homogenization in marginal landscapes.

One example of the influence of direct payments on landscape is the support to irrigated agriculture. In some Member States like France, specific subsidies for irrigated land were set up in 1992 in the form of differentiated direct payments. Farmers with irrigated land could receive an extra payment of up to 262 Euros/ha. In the countries where decoupled payments are calculated on the historical basis, the SFP still includes some kind of "irrigation subsidies" (Boulanger 2007). The extra payments for irrigation ended in 2010. Irrigation modifies landscape by extracting water from an available source, and adding water to fields where there was none or little before. It contributes to greener landscapes, and increases the mosaic of landscapes where not all plots are irrigated. Irrigation is also linked to the introduction of man-made structures and features to extract, transfer and dispose water. The impact on the value of the landscape is ambiguous.

CAP and set aside

Description of CAP measures

Set-aside is the land that farmers are not allowed to use for any agricultural purpose, except for the cultivation of non-food crops (including energy crops) in some specific years of the set-aside implementation. It was introduced in the CAP in 1992 to prevent over-production. Under the terms of the 1992 reforms to the arable regimes (Regulation 1756/92), crop farmers had to set aside a minimum of 15% of their cropped farmland for the harvest year of 1993. A simplified scheme, with no set-aside requirement, was also available for farmers with a limited area of arable land.

The total area of set-aside was considerable, accounting for 7,259,000 ha in EU-15 in 1996 (5.2% of total Utilised Agricultural Area) (Brouwer and Lowe 2000). The countries with a high proportion of small arable holdings (for example Belgium, Greece, Ireland, The Netherlands and Portugal) opted for the simplified scheme and therefore had a low number of set-aside areas. In some other countries like Sweden, Finland or Denmark, farmers were encouraged to voluntarily set aside thus increasing the proportionate importance of set-aside (around 9%).

By the year 2000 the compulsory set-aside area had dropped to 5% and due to the significant rises in grain prices across Europe, set-aside was abolished in the Health Check reform of the Common Agricultural Policy in 2008.

While set-aside has been abolished at EU level, some countries like France have included requirements on environmental cover within the good agricultural and environmental condition (GAEC) standards. French farmer recipients of direct payments need to place 3% of their cropped land under environmental cover alongside watercourses, hedgerows and on slopes. Environmental cover should measure a minimum of 5 to 10 meters wide, and be free of the use of fertilizers and pesticides. Even if the objective is different to that of the set-aside introduced in 1992, one can argue that the visual impacts on landscapes are similar. The European Commission (EC) proposal for the CAP post-2013 on "ecological focus areas" (see section 3.1) could also have similar consequences for landscape.

Illustration 2 shows how field margins contribute to landscapes' visual character by introducing colour variety.

Illustration 2: Colour variety and field margins

Village of Šardice and Ratíškovice, region Kyjovské Slovácko, Czech Republic

© Cyril Gajdik, ENRD 2012



Influence on landscapes

Nowadays, land set-aside is acknowledged to contribute to the mosaic pattern of landscape, especially in areas dominated by arable crops. The influence on landscapes will depend whether the set-aside requirement is associated with conditions relative to the location and vegetation of the plot. Set-aside requirements contribute to the reintroduction of fixed elements such as hedgerows or isolated trees (Oréade – Brèche 2005).

However, the perception of the influence of set-aside on landscapes has not always been positive. When the set-aside obligation was introduced in 1992, farmers and society perceived it as detrimental to landscape because it was associated with land abandonment. Many farmers decided to set aside their less productive land, without considering the influences on the landscape mosaic, as well as the potential for greater environmental benefits (such as improved biodiversity, habitat restoration, reduced water pollution and maintenance of countryside) or the agronomical benefits of moving the location of set-aside each year (Firbank 1997). Despite the fact that Council Regulation 2293/92 required Member States to "apply appropriate measures which correspond to the specific situation of the land set aside so as to ensure the protection of the environment" (Article 10), potential benefits were reduced by the failure of some Member States to establish rules for the appropriate care of set-aside. Moreover, the lowering of the set-aside obligation (from 15% in 1993/94 to 5% in 1998/99), and the possibility of growing non-food crops (e.g. industrial oilseeds) on set-aside land have also limited the potential environmental and landscape benefits of this market measure (Brouwer and Lowe 2000).

1.2) The role of cross compliance for landscape conservation

Description of the measure

Since 2003, to determine if the utilised agricultural area under arable crops, permanent crops or permanent pasture is eligible for CAP pillar I payments, the EU has introduced rules and guidelines, intended to ensure that the agricultural land receiving CAP support meets a minimum agricultural and environmental standard. The "statutory management requirements" (SMR) cover directives and regulations that have existed for years and apply to all farmers (even those not receiving EU support). In addition, in order to receive the full decoupled direct payment a farmer has to comply with good agricultural and environmental condition (GAEC) standards, whose objective is to ensure that all agricultural land, especially land which is no longer used for production purposes, is maintained in good condition.

Member States shall define GAEC standards, at national or regional level, on the basis of 5 issues and 15 standards (8 compulsory and 7 optional) described in Annex III of Council Regulation (EC) No 73/2009 (Table 2). Minimum GAEC requirements should be defined for all "compulsory standards" and they should take into account the specific characteristics of the areas concerned, including soil and climatic condition, existing farming systems, land use, crop rotation, farming practices and farm structures. The definition of minimum requirements for the "optional standards" is not compulsory for the Member State except where the Member State has already defined a minimum requirement for that standard before 1 January 2009 or/and where national rules addressing that standard are applied in the Member State. The implementation of the GAEC framework results in a high variety of minimum requirements throughout Europe and sometimes even within the MS when GAECs are defined at regional level. For example, France requires that the recipients of direct payments also place a minimum proportion of cropped land under environmental cover alongside watercourses, hedgerows and on slopes; Italy requires farmers to preserve and prevent degradation of terraces. The UK does not permit the removal of dry stone walls and the Czech Republic and Italy have introduced bans on the conversion of permanent grassland to arable land at farm level (Cooper, Hart et al. 2009; Valbuena, Verburg et al. 2010).

Table 2: Good Agricultural and Environmental Condition (GAEC) standards

Issue	Compulsory Standards	Optional Standards
Soil erosion: Protect soil through appropriate measures	Minimum soil cover	Retain terraces
	Minimum land management reflecting site-specific conditions	
Soil organic matter: Maintain soil organic matter levels through appropriate practices	Arable stubble management	Standards for crop rotations
Soil structure: Maintain soil structure through appropriate measures		Appropriate machinery use
Minimum level of maintenance: Ensure a minimum level of maintenance and avoid the deterioration of habitats	Retention of landscape features, including, where appropriate, hedges, ponds, ditches, trees in line, in group or isolated and field margins	Minimum livestock stocking rates or/and appropriate regimes
	Avoiding the encroachment of unwanted vegetation on agricultural land	Establishment and/or retention of habitats
	Protection of permanent pasture	Prohibition of the grubbing up of olive trees
		Maintenance of olive groves and vines in good vegetative condition
Protection and management of water: Protect water against pollution and run-off, and manage the use of water	Establishment of buffer strips along water courses	
	Where use of water for irrigation is subject to authorisation, compliance with authorisation procedures	

Source: Annex III of Council Regulation (EC) No 73/2009

Influence on landscapes

GAEC standards related to landscape are the retention of landscape features (like field margins, hedges, ponds, ditches and trees) which contribute to the aesthetic value of landscapes, as well as minimum soil cover and minimum land management, which impede the negative visual aspect of plots associated with soil erosion, the overgrowth of vegetation and the closure of landscapes.⁷ Compulsory establishment of buffer strips along water courses aims to protect water against pollution and run-off but also influences the landscape mosaic when plots are along water courses.

⁷ Trees and shrubs are said to form a "closed cover" where its upper surface is so uneven that it is not possible to distinguish separate layers of cover (Di Gregorio et al. 2000)

Illustration 3 represents the fact that hedgerows and trees are considered typical elements of agricultural landscapes, which therefore justify their conservation.

Illustration 3: The importance of fixed elements such as hedgerows and trees in agricultural landscapes

Across the lake © Susan Wallis



A winter view © Susan Wallis

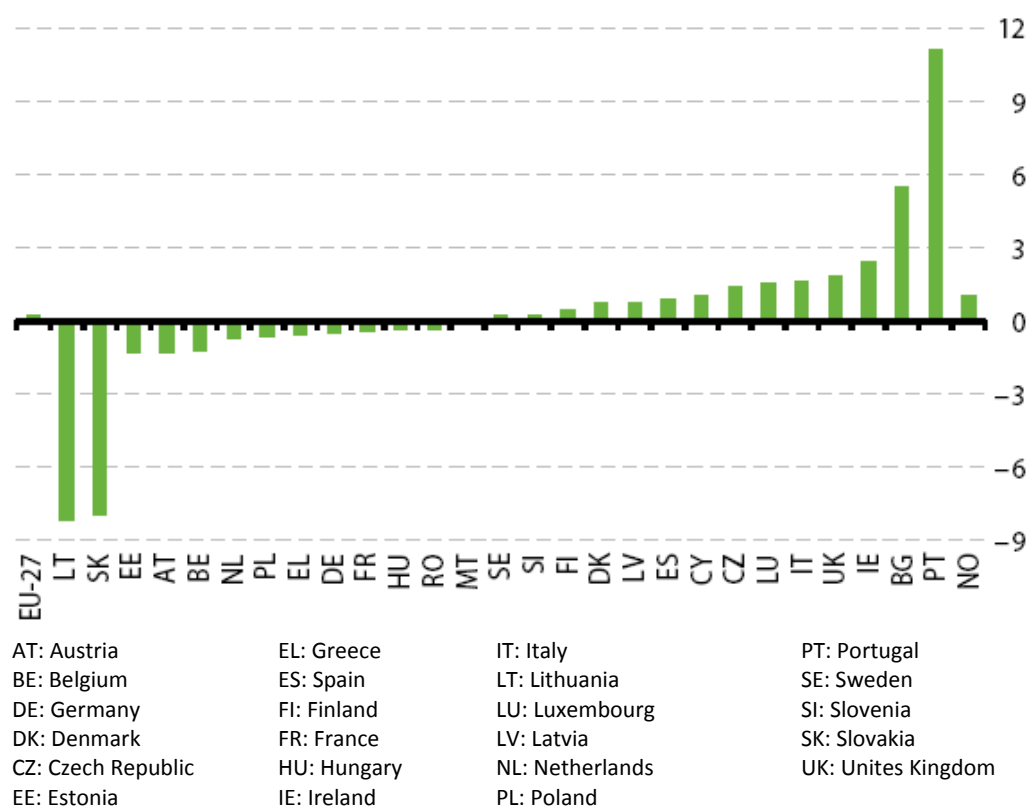


In the framework of cross compliance, Member States also have to ensure that land which was under permanent pasture at the date provided for the area aid applications is maintained under permanent pasture (article 6(2) of council regulation 73/2009). The value of permanent pasture for the environment has long been recognised and led to the introduction of a safeguard being put in place under the 2003 CAP Reform ‘to encourage the maintenance of existing permanent pasture to avoid a massive conversion into arable land’, given its ‘positive environmental effect’. “Permanent pasture” is defined as the land used to grow grass or other herbaceous forage that has not been included in the crop rotation of the holding for five years or longer.

Each year, the annual ratio between permanent pasture area and UAA shall not decrease by more than 10% relative to the reference ratio established by each Member State. This obligation shall apply at national or regional level. This measure is complementary to the compulsory GAEC standard for the ‘protection of permanent pasture’, which operates at farm level and requires Member States to introduce conditions that protect permanent pasture, but without any requirements for minimum percentages to be maintained. The way in which this farm level GAEC is implemented is very variable between Member States. Permanent pasture conservation is also a major concern in the EC proposal for the greening of pillar I in CAP post-2013 (see section I.3.1). Between 2003 and 2007 (therefore after the introduction of the SFP scheme) permanent pastures remained almost stable at EU level (+0.63%), but with some countries like Lithuania and Slovakia experiencing an important reduction of grassland (nearly 10%) (Figure 5). The rationale for the maintenance of existing permanent pasture is to avoid massive conversion to arable land, and thus to protect farmland biodiversity, enhance carbon sequestration in soil and limit soil erosion. Nevertheless, this measure is also likely to influence the aesthetic value of landscapes. It can benefit the maintenance of grazed landscapes

across Europe and favour landscape diversity. In their estimation of EU citizens' willingness to pay for EU landscapes (meta-analysis), Ciaian and Gomez y Paloma (2011) found that the estimated per hectare average value of EU agricultural landscape is higher for grassland and permanent crops compared to arable land (200 Euros/ha and 117 Euros/ha respectively).

Figure 5: Change in the share of grassland in total UAA between 2003 and 2007 (% change)



Source: (EUROSTAT 2011)

2. Pillar II: Rural development policies and their influence on landscape provision

Agenda 2000 established Rural Development Policy as the second pillar of the CAP, and brought Rural Development under a single regulation to be applied across the whole European Union. While support for landscape conservation and restoration is mainly addressed under Axis 2 via agri-environmental and less-favoured area measures, other non-targeted measures are also influencing the EU agricultural landscape (European Commission DG Agriculture and Rural Development 2011a). In addition to environmental concerns (Axis 2), pillar II also addresses agricultural restructuring (Axis 1) and the wider needs of rural areas (Axis 3).⁸

2.1) The integration of landscape conservation objectives in Agri-environmental measures

Agri-environmental measures (214) are the primary policy instrument used to encourage farmers to protect and enhance the landscape elements on their farmland. They provide payments to farmers in return for a service related to reducing environmental risks associated with modern farming and/or preserving natural resources, soil and cultivated landscapes. Agri-environmental measures can either reward farmers for entering into commitments going beyond mandatory and baseline requirements, or reward them for the continuation of their activities with positive influences on environmental protection and landscape conservation (Beaufroy, Baldock et al. 1994). The rationale for this support is the market failure in the provision of public goods (i.e. the gap between the supply of public goods by farmers and the demand by society). Therefore, farmers need a monetary incentive to modify their practices and thus provide more public goods. It therefore requires public intervention with taxpayers financing the provisioning of these public goods.

One of the merits of the measure is its flexibility, which allows Member States to develop voluntary schemes that reflect different bio-physical, climatic, environmental and agronomic conditions to suit local conditions. Nevertheless, it is compulsory for MS to implement agri-environmental measures in their Rural Development Programmes. Agri-environmental measures are established by Member States or regions and submitted to the Commission for approval as part of their Rural Development Programmes. Farmers sign a contract with the administration and are paid for the additional cost of implementing such commitments and for any losses of income (e.g. due to reduced production) which the commitments entail. The contractual nature of the agreement is important as it provides a frame (minimum 5 years) within which the requirements, the timescale concerned and the payment to be made are set out clearly. It also ensures a sustained commitment by the farmer, who has the certainty of receiving the corresponding payment upon compliance.

Agri-environmental payments are co-financed by the EU and the Member States. In 2009, the agricultural area enrolled in agri-environmental measures amounted to nearly 38.5 million ha and represented 20.9% of the UAA (Utilised Agricultural Area) in the EU-27 (European Commission DG

⁸ To help ensure a balanced approach to policy, Member States and regions are obliged to spread their rural development funding between the three thematic axes and some of the funding must also support projects based on the "Leader approach" to rural development, i.e. individual projects designed and executed by local partnerships to address specific local problems (Axis 4).

Agriculture and Rural development 2011b). This share was significantly higher in the EU-15 (25.2% or 33.5 million ha) than in the EU-12 (9.7% or 5 million ha).

Other Axis 2 measures, such as the support for non-productive investments (216) and Natura 2000 and Water Framework Directive related payments (213), are also indirectly related to the preservation of landscapes. Measure 213 provides support to compensate for the additional costs of undertaking appropriate management on agricultural Natura 2000 sites, in order to maintain or restore a favourable conservation status, natural habitats and species of wild fauna and flora of community interest (article 2(2) of the habitats directive, council directive 92/43/EEC of 21 May 1992) (Cooper, Hart et al. 2009).

Table 3 presents a classification of the current agro-environmental schemes (RDP 2007-2013) and their potential influence on landscapes. The real influence on landscapes is very often context-specific and dependent upon a range of factors, such as how and where the management actions are implemented (the priorities addressed by Member States in their Rural Development Programmes) and the level of uptake across a region or target area (therefore the farmers' willingness to participate in the agri-environmental schemes)

A recent study by the Institute for European Environmental Policy (2011) shows that 58% of the 81 Rural Development Programmes they studied in continental Europe include management actions related to landscape feature management. Moreover, according to the monitoring of RDPs for the period 2007-2013, landscape-related measures account for around 40% of Axis 2 measures offered to farmers in the national Rural Development Programmes, in terms of area enrolled (European Commission DG Agriculture and Rural development 2011b) (Figure 6). Examples of landscape management actions include: maintaining the appropriate style in keeping with the local landscape, pruning and thinning, restrictions on pruning or cutting hedgerows during the bird breeding period of late spring and early summer, limiting the use of fertilisers, or simply 'maintain' the features present on the holding. Actions are delivered, either in packages focused entirely on the management of landscape features or as part of a package which has a broader range of objectives and includes other types of management actions (Table 4).

Table 3: Classification of the agro-environmental schemes (RDP 2007-2013) and their potential influence on landscapes

Measure	Description	Influence
Organic farming	Organic farming is a clearly defined and controlled farming system that incorporates a wider range of farming practices (e.g., input reduction, no use of chemical substances, rotation, limits on livestock stocking density, soil cover).	+
Integrated production	Integrated Production is a knowledge-based approach to farming, based on maximising natural control processes for pest and soil management. IP also includes the integration of crops and livestock into production systems. Mixed crop-livestock systems allow the most effective and efficient use of natural resources and biological cycles and processes (AEI 01 fact sheet 2012).	+
Other extensification of farming systems	Other extensification of farming systems include actions targeting the reduction and better management of fertilisers and plant protection products and the extensification of livestock.	+
Diversification of crop-rotations	Diversification of crop rotations includes rotation measures and in some cases conversion of arable crop to grassland for the benefit of wildlife	++
Reduction of irrigated areas and/or irrigation rates, limitation of draining		++
Action to conserve soil	Action to conserve soil includes labour techniques to prevent and reduce soil erosion, green cover, conservation agriculture, mulching	++
Management of landscape, pastures and high nature value areas	Management of landscape, pastures and high nature value areas includes upkeep of the landscape and maintenance of high nature value farmland areas, including the conservation of historical features (e.g. stone walls, terraces, small woodlands); management of pastures (including limits on livestock stocking rates, low-intensity measures, mowing) and creation of pastures (including conversion of arable crops; management of other high nature value farmland areas (e.g., traditional orchards). These measures can have a strong positive influence on biodiversity if well designed.	+++
Actions to maintain habitats favourable for biodiversity	Actions to maintain habitats favourable for biodiversity include leaving of winter stubble in arable areas, adaptation of mowing dates	+
Genetic resources	Preservation of genetic resources includes the maintenance of local endangered breeds and the protection of rare plant varieties under threat of genetic erosion.	+
Other targeted actions		

Notes: Authors' judgment according to DG AGRI, AEI 01 (Area under agro-environmental support) factsheet measure description.

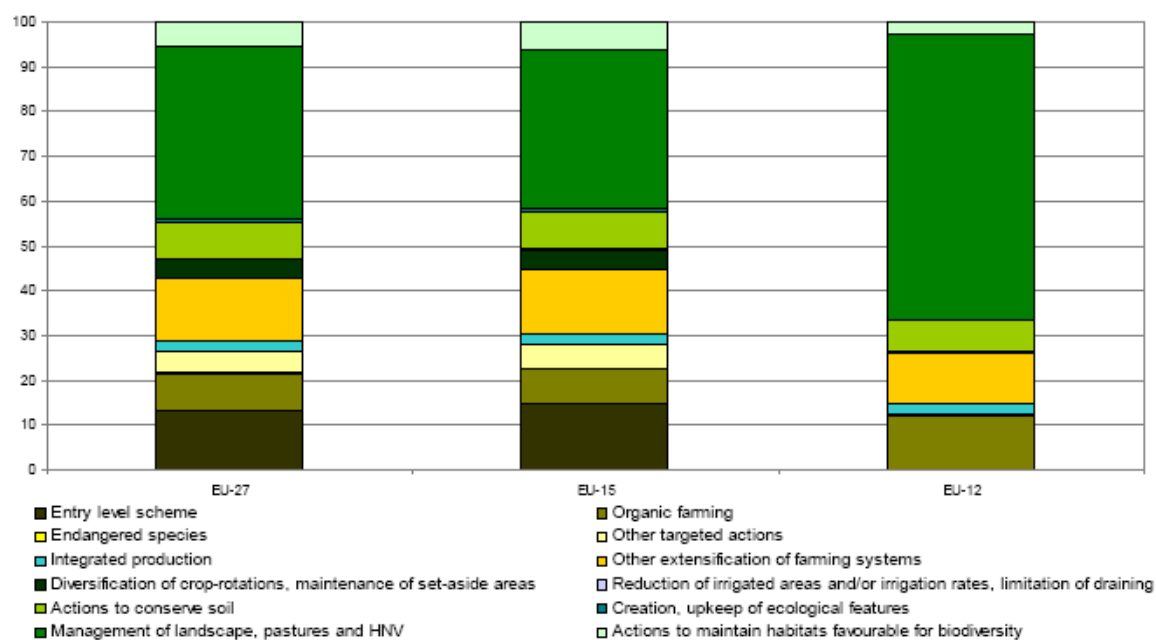
+++ : measure with direct focus on landscape, strong potential influence

++ : measure with no direct focus on landscape, strong potential influence

+ : measure with no direct focus on landscape, small potential influence

Remark: Contribution of different measures to the landscape objectives is described as 'potential' because the actual contribution is very often context-specific and dependent upon a range of factors, such as how and where the management actions are implemented and the level of uptake across a region or target area.

Figure 6: Breakdown of area under agri-environmental measures by type of action in the EU in 2009 (%) - AEI 1 factsheet -



Source: DG Agriculture and Rural Development, output indicators of the CMEF of the Rural Development Programmes, 2007-2013

Note: Data on the area under different types of commitments only include contracts signed in 2007, 2008 and 2009 under Regulation (EC) No 1698/2005.

Table 4: Examples of actions implemented in RDPs for the management of landscape, pastures and high nature value areas

Packages focussed entirely on the management of landscape features	In Wallonia, Belgium, there are three separate packages of actions whose main focus is landscape management. Each focuses on a different type of landscape feature: hedgerows; trees, shrubs, and groves; ponds. Each package commands a different payment rate and has a different set of requirements. For example, for hedgerow management farmers must declare and maintain all hedgerows, these must be composed of native species, be a minimum of 20 metres in length and maximum 10 metres in width, no fertilisers or PPPs may be used, and no maintenance carried out between 15 April and 1 July.
	In Lithuania: Under the 'Landscape Stewardship Scheme' one package is focused entirely on the maintenance of structural landscape elements. This package is primarily aimed at the management of hedgerows and requires farmers to trim the hedges at least twice during the year, but not during the bird-breeding season (1 March to 31 July).
	In the UK, a long-standing focus of agri-environmental policy has been the conservation of traditional field boundaries, mainly hedges and stone walls, for their contribution to landscape and cultural objectives, with entry level management focusing on the maintenance of such features in good condition.
Actions related to landscape management are delivered as part of a package, with a broader range of objectives and includes other types of management action.	In Austria, farmers are required to carry out a range of actions for environmentally friendly management of grassland, including limiting both fertiliser inputs (maximum 150kg nitrogen/ha) and livestock density (maximum 2LU/ha), complying with a cutting regime and keeping records, as well as the maintenance and management of landscape features.
	In Slovenia, farmers participating in the scheme "Maintaining extensive Karst pastures" are required to carry out a wide range of actions including (but not limited to) training, limiting livestock density between a minimum of 0.2LU/ha and a maximum of 1.9LU/ha, observing restrictions on management dates, no tillage, and limiting fertiliser application (no nitrogen fertilisers). As part of the package, existing hedges must be maintained including pruning and thinning every other year but not between 1 March and 30 September.

Source: (Institute for European Environmental Policy 2011)

The extent to which agro-environmental programmes can deliver landscape public goods depends not just on the type of management actions within RDPs, but also on how they are differentiated and tailored to local circumstances and, crucially, on the effective implementation by a significant proportion of farmers in the most appropriate locations. There is no specific analysis available on the attractiveness of landscape-related measures but we can observe that the most important types of agri-environmental commitments in terms of area enrolled are related to landscape (Figure 6). The management of landscape pastures and high nature value farmland measures covered around 13.5 million hectares and represented 39% of the total area committed across the EU-27. This type of commitment was higher in the EU-12 (64%) than in the EU-15 (35.8%) and was applied in 17 Member States. It was particularly important in five countries where it represented more than 70% of the total area, namely in Bulgaria (81%), Estonia (100%), France (88%), Romania (99%) and Sweden (71%).

The willingness of farmers to participate in the agri-environmental schemes depends both on "scheme factors" (such as payment, duration, logistics or flexibility) and "farmer factors" (farm characteristics, farmer socio characteristics and attitude to the environment) (Brotherton 1989; Brotherton 1991). For example, Brouwer and Godeschalk (2004) found that the intensity of production (in terms of economic size of the farm per ha) for holdings that participate in agri-environmental programmes tends to be less than for holdings that have not entered into such programmes. Indeed, the income foregone due to the agri-environmental programmes is higher in highly intensive production methods (in terms of production per unit of land). There are few papers focused on landscape-related agri-environmental measures. Borsotto et al. (2008) is one of them, and provides an empirical investigation into the decision to participate in rural landscape conservation schemes in Italy. Using a sample of 2149 household farms located in three northern Italian regions—Alto Adige, Lombardy and Piedmont-, they found that, despite the emphasis given to this issue and the increasing resources devoted to landscape conservation schemes, farmers' participation is still very low. According to their results the probability of participating in a landscape conservation scheme is correlated with the farmer's income. In addition to this, the probability is influenced by farm characteristics; mainly the use of organic farming practices, specialization in livestock production and location of the farm in mountain areas.

Farmers in the same neighbourhood have different objectives, management criteria and constraints, and therefore perform different actions related to landscape. The issue of aggregation of individual actions into a landscape effect is not obvious. Identifying precisely the contribution of each landowner's action to the resulting landscape change is a difficult task (Lifran 2009). The impact of individual actions will depend on which public good production model is required for the desired landscape. There are three basic models of the joint production of a public good: the additive one, when actions of each contributor are perfect substitutes as the different contribution sum-up; best-shot, when one or a few efficient contributions are enough to provide almost all the value of the public good; and the weakest link, where the public good is not provided when only one contribution is missing. The incentives provided by the agri-environmental schemes should be in line with the underlying production model required to provide the public good. The challenge for landscape agri-environmental schemes arises from the necessity to integrate the topology and spatial arrangements of landscape components as an additional dimension in the agri-environmental measure design.

Unfortunately, agri-environmental schemes in Axis 2 are not designed to organize the coordination of action between farms. Contract applications and conclusions are considered by the administration on an individual basis. Coordination between farms at a higher territorial level is usually not enforced. We propose here some examples found in the literature on schemes adapted to the cases where coordination across farms is requested. Lifran (2009) present the example of preferences for a diversified landscape, with a mix of forested patches and fields equally scattered in the landscape

unit. A high rate of landowners choosing to afforest their land results in failure to fulfil the objective of landscape mosaic. An additional requirement is the rate of forest and field in each local neighbourhood. Therefore, the design of the afforestation schemes should promote the diversity of patches in terms of land use in the neighbourhood. The voluntary incentive mechanism proposed by Parkhurst et al. (2002), the agglomeration bonus, is designed to protect endangered species and biodiversity by reuniting fragmented habitats across private land. The mechanism provides incentive for non-cooperative landowners to voluntarily create a contiguous reserve across their common border. The same idea can be adapted if the agglomeration of patches with the same land uses or characteristic is a desired landscape. The basic payment would be given for the change in land use, while an additional payment would be conditional to the proposed plot being contiguous to another with a distinct land use. Dupraz et al. (2009) propose another example of design of agri-environmental schemes when the bio-physical processes are characterised by threshold effects. The idea of threshold effect can perfectly apply to some landscapes where no perceptible change in the landscape state occurs unless a specified farming practice is applied on a minimal area in the zone of interest. The basic idea is the following: the payment to each individual farmer is conditional upon the total intention of contracting being greater than the area needed to pass the threshold. This favours a cooperative solution, even when asymmetric information occurs on the farmers' willingness to accept. Dupraz et al. consider different situations, including the lack of information on farmers' characteristics or actions, uncertainty on the relationship between farming practices and environmental quality, and combined difficulties of scheme design.

2.2) Support to Less Favoured Areas and the maintenance of farmed landscapes

The Less Favoured Areas (LFA) measures (211 and 212) provide a mechanism for maintaining the countryside in areas where agricultural production or activity is more difficult because of natural handicaps.

Description of the measure

For many decades European countries had addressed the problems of LFA, and particularly those of mountain areas, through local sectoral policy programmes (Brouwer and Lowe 2000). This idea was introduced into the CAP in 1975 (directive 75/268). The LFA policy was conceived as a structural policy to reduce the differences in farm income due to differences in agricultural productivity across regions within the EU, and to prevent land abandonment by maintaining agricultural activities and rural population. In this respect, the LFA scheme indirectly addresses the question of supporting environmentally beneficial farming systems.

According to Council Regulation (EC) No 1257/1999⁹, LFA are classified in three categories, each of which describes a specific cluster of handicaps which threatens the continuation of agricultural land use. The first category is mountain areas where the growing season is short or farming difficult due to steep slopes and/or high altitude (article 18). The second category is 'Other' less favoured areas in danger of abandonment of agricultural land use where the conservation of the countryside is necessary (article 19). They exhibit the following handicaps: land of poor productivity; production which results from low productivity of the natural environment; and a low or dwindling population predominantly dependent on agricultural activity. The third category is areas affected by specific handicaps where farming should be continued in order to conserve or improve the environment, maintain the countryside, and preserve the tourist potential of the areas, or in order to protect the coastline (article 20).

In the EU-27, more than half of the total UAA (54%) has been classified as LFA. The highest share is taken up by 'other' LFA (34%), followed by mountain areas (16%) (European Commission DG Agriculture and Rural development 2011b). LFA payments are granted annually per hectare of utilised agricultural area. Levels of payment vary significantly across Member States, ranging from national average payments per eligible hectare of between Euros15 and Euros55 in Spain, Sweden, Poland and the UK, to payments of between Euros175 and Euros250 per eligible hectare in Austria, Finland and Malta. Within countries, payment levels may vary further, for example across different categories of LFA. The payment ceiling set at EU level may be exceeded in individual cases, provided

⁹ In 2003, the implementation of the LFA scheme was subject to criticism in a report of the European Court of Auditors, in particular as regards the designation of other LFAs and the lack of targeting of the aid. Article 50.3(a) of Regulation (EC) No 1698/2005 provided a new definition of areas with natural handicaps other than those which are mountainous in character and than those with specific handicaps. However in 2005 the Council did not reach an agreement on a possible Community-wide system for classifying these areas in line with the new definition and the policy objectives. It was therefore decided to maintain the previous system in force for a limited period of time and the Commission was asked to undertake a review of the LFA scheme with a view to presenting a proposal for a future payment and designation system applicable from 2010. In April 2009 the Commission adopted a communication paving the way towards a new classification of agricultural areas with natural handicaps (COM(2009) 161 final). Until now, the provisions of Regulation (EC) No 1257/1999 are still in place.

that the average level of aid paid out by each Member State complies with the limit set in the regulation (The European Union Committee of the House of Lords 2009).

Illustration 4: Farmers preparing the field in the hills above Nepos, Romania

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“High Nature Value farming” (HNV) is a different but related concept, which refers to the low input farming systems associated with high biodiversity, of which three main categories can be distinguished: farmland with a high proportion of semi-natural vegetation, farmland with a mosaic of low intensity agriculture and natural and structural elements, such as field margins, hedgerows, stone walls, patches of woodland and scrub, and small rivers, and farmland supporting rare species or a high proportion of populations (Paracchini, Terres et al. 2007). We can see in Figure 7 that there is a high correlation between the map of LFA and the map showing the likelihood of HNV presence.¹⁰ Areas of High Nature Value farmland largely overlap with traditional agricultural landscapes, having low input farming systems as their common denominator. A more detailed quantification (in spatial and typological terms) of such an overlap is hardly feasible, since no comprehensive guide exists of European traditional landscapes, and currently available descriptions of farming systems maintaining HNV farmland are still too crude for this purpose, or only locally available. Furthermore, the link with the cultural elements or traditions that have generated such systems is often only known locally (Paracchini, et al. 2007).

The development of agriculture, the changes in socio-economic conditions throughout Europe and the implementation of the Common Agricultural Policy have caused a general loss of High Nature Value farmland and associated landscapes, especially in the post-war period (Paracchini, Terres et al. 2007). Most of the remaining HNV areas are marginal lands. HNV landscapes are threatened by the intensification of grassland management, with nutrient over-enrichment by fertilizers or high stocking rates, by over-grazing, by land abandonment and cessation of traditional land management practices such as mowing or scrub clearance. The awareness of the need to stop such trends has led to the recognition of the importance of HNV farming in agricultural policy. The Community Strategic Guidelines for Rural Development (RDP 2007-2013) emphasise the preservation and development of HNV farming and forestry systems and traditional agricultural landscapes as one of the priority areas of Rural Development. While there is no specific instrument targeted at HNV farming, there are

¹⁰ This map is built on estimates on the likely spatial distribution of HNV across Europe. As Member States are given the flexibility to define what is classified as HNV in their country no exact map is available at EU level.

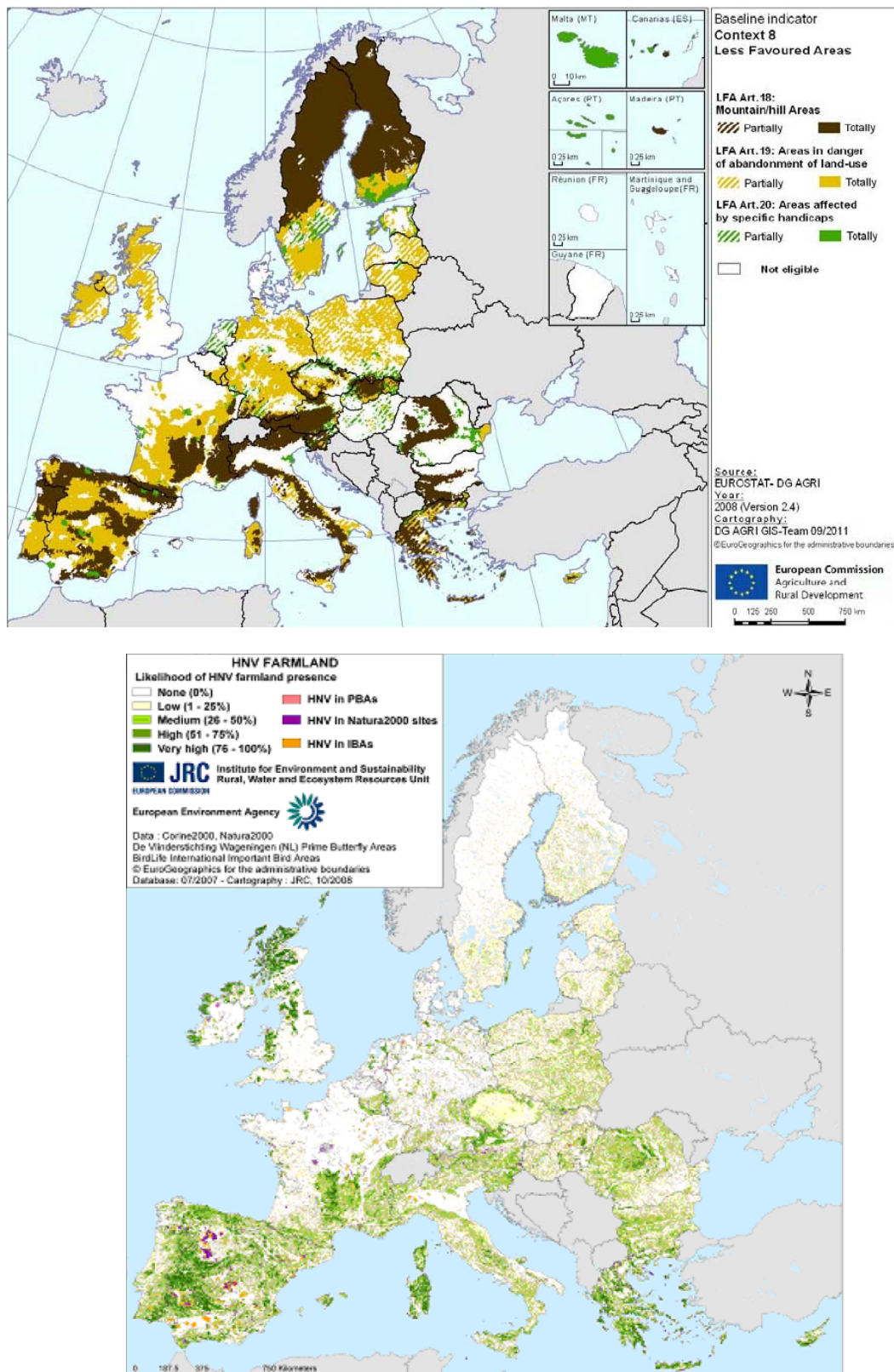
several Rural Development measures that can be employed to address a range of aspects relevant for supporting HNV farming: agri-environmental schemes, Natura 2000 payments and LFA payments.

Influence on landscapes

The continuity of farming systems in Less Favoured Areas is seen as central to the preservation of cultural landscapes, with their aesthetic and recreational values. Indeed, when farming declines, land is abandoned or under-used, scrub and forest encroach and the open landscape disappears (Vanslebrouck and VanHuylbroeck 2005). There is also a significant risk of biodiversity loss, desertification, and increased frequency of forest fires. Due to the handicap to farming, the probability of land abandonment is higher in LFA. CAP support to LFA contributes to mitigate these risks. Nevertheless, it should be noted that land abandonment is highly difficult to predict and depends on a large number of uncertain and complex interactions between changing economical, social and environmental factors, resulting in economic marginalisation. LFA support is also crucial to bolster farm incomes in regions where there are few other economic activities. The continuation of farm management, particularly in mountain areas, acts as a prerequisite for other sectors, such as tourism and the maintenance of infrastructure facilities (OECD 1998).

However, evaluation studies have shown that while payments have contributed to continued agricultural land management in marginal areas, the measure is not targeted at the areas of greatest biodiversity value or where the risk of land abandonment is greatest (Cooper, Baldock et al. 2006). The influence on the value of landscape is ambiguous. Abandoning production in marginal areas can have a negative influence on landscape because of the homogenisation effect. But, on the contrary, Arriaza et al. (2004) found that the maintenance in production of land of poor agricultural quality, as an alternative to natural vegetation, decreases the perception of wilderness in the landscape, and thus its beauty.

Figure 7: Less Favoured Area (top) and High Nature Value farmland (bottom)



Note: The IRENA methodology provides area estimates of the share of HNV farmland per Member State on the basis of information derived from land cover and FADN data. The table above is based on land cover only; FADN data will be added in future updates of the IRENA indicator data sets. Further information can be found under <http://eea.eionet.europa.eu>

Source: (European Union Directorate-General for Agriculture and Rural Development 2011)

2.3) Afforestation and agro-forestry measures: influence on land-use change

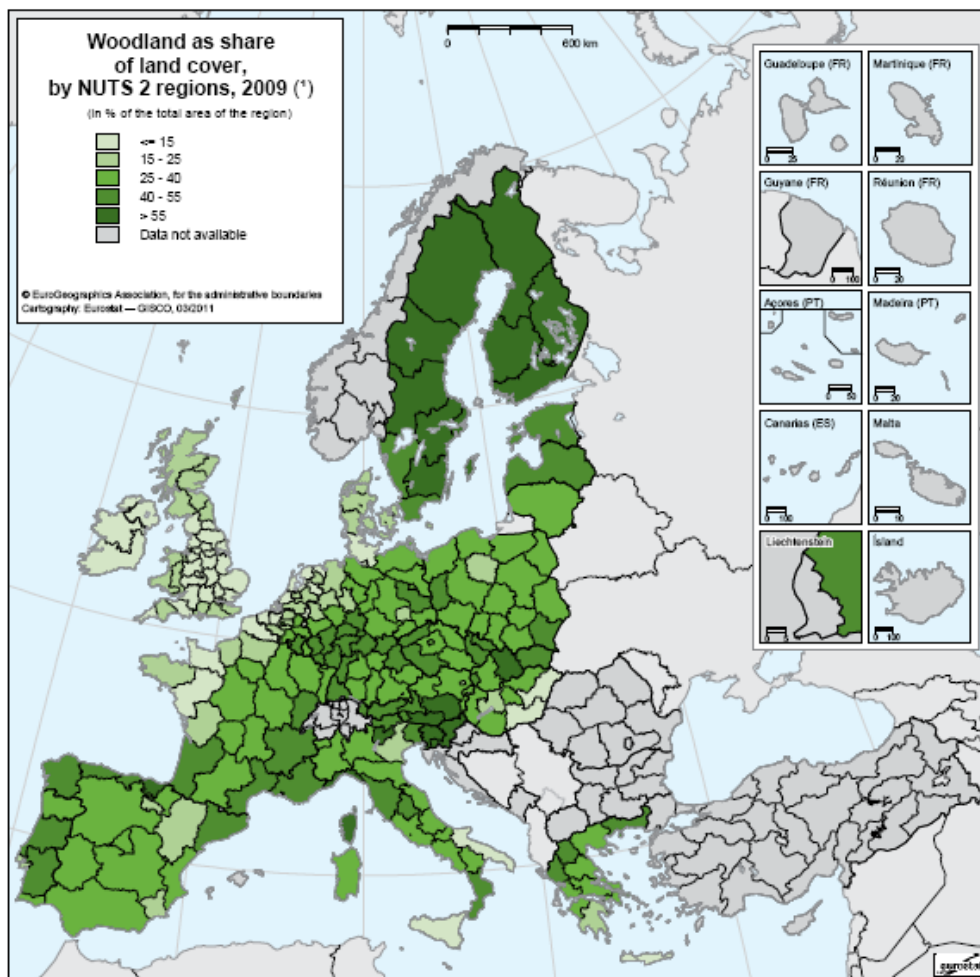
Whilst there is no common forestry policy, a number of measures have been introduced that affect the forestry sector and agricultural land. Regulation 1610/89, provided measures to promote forests in rural and less developed regions, with priority given to areas where forestry can help the economy, create jobs, encourage tourism and recreation, tackle erosion or protect soil and water resources. The Community aid scheme for forestry measures in agriculture (2080/92) was introduced to reduce agricultural surplus by afforesting arable land and pastures, as well as to provide greater environmental balance in countryside management, and to combat the greenhouse effect by absorbing carbon dioxide. Under this scheme, financial aid was given (on a contractual basis) to cover the costs of afforestation, forest maintenance, income loss and investment to improve existing farm woodland (Rounsevell, Audsley et al.). One million hectares of agricultural land were afforested between 1994 and 1999 owing to Regulation 2080/92 (Institute for Forestry Development 2001). In the Rural Development policy 2007-2013, three measures are related to afforestation and agroforestry, in particular measure 221 "first afforestation of agricultural land"; measure 222 "first establishment of agro-forestry systems on agricultural land" and measure 223 "first afforestation of non-agricultural land".

The promotion of tree plantation has a drastic influence on landscape due to the land use change (change from field/permanent crops to trees). Figure 8 represents woodlands as a share of land cover. Plantation forests are characterized by species that grow fast and produce higher levels of timber volume per hectare using simplified stand structures. Historically, plantations were laid out in geometric patterns, to simplify management. These patterns comprise a series of rectangular compartments, possibly laid out on a strict grid, separated by open strips and fire breaks, the trees being planted in straight rows to facilitate machine operations such as ploughing, draining, weeding or thinning. From the description above, it is easy to see that a plantation forest differs markedly from a natural one in a number of attributes. These differences are often cited as predominantly negative aspects of plantations, in that they are rightly seen as ecologically deficient in comparison with natural forests (Halldorsson, Sigurdís Oddsdóttir et al. 2005). Tahvanainen et al. (1996) studied the visual impacts of gradual afforestation in Finland. They interviewed private non-industrial forest and agricultural landowners, potential recreationists, and professionals of land use management. They found that, in general, the scenic beauty decreased with the increasing intensity of afforestation. An exception to this was moderate afforestation, which can have a positive effect on scenic beauty. The more attractive the original landscape was, the greater the effect of afforestation was found to be. Nowadays, the development of the practice of forest landscape design has enabled a better integration of tree plantations into the landscape (Halldorsson, Sigurdís Oddsdóttir et al. 2005). One solution, illustrated in Illustration 5, is the co-existence in the same landscape of agricultural and forest plots.

Illustration 5: The co-existence of agricultural and forest plots in a landscape
Slovak garden Horehronie, Slovakia © Ľubomír Majerský, ENRD 2012



Figure 8: Woodlands as share of land cover (by NUTS 2 regions) 2009



(!) Bulgaria, Cyprus, Malta and Romania were not included in the LUCAS 2009 survey.

Source: LUCAS survey 2009 (EUROSTAT 2011)

Measure 222 "*Agroforestry*" has the potential to create high value landscapes including the presence of fixed elements such as trees on cultivated land. During the past 20 years, scientific research and field experience have highlighted the agricultural and environmental benefits that can be obtained from the complementarities between trees and crops or livestock. For example, there is now evidence that agroforestry can provide a vast range of benefits: economic (thanks to the diversification of activities with different timeframes: annual production of crops and pasture, and long-term production of timber), agricultural (control of soil erosion, provision of shelter and shade, improved animal welfare, habitat for organisms controlling pests), and environmental (carbon sequestration, biodiversity, reduction of nitrate leaching, and enhanced landscape diversity) ((McAdam, Burgess et al. 2009); (Palma, Graves et al. 2007)).

Illustration 6: Agroforestry systems

Top left: lavender and olive trees; Top right: dehesa livestock and oak;
Bottom left: cabbage and olive trees, Bottom right: wheat and walnut trees.
© Agrooof



Despite this evidence, agricultural and forestry policies in Europe have traditionally developed along separate tracks. Some of the initial policies developed under the CAP included direct support for the removal of trees and hedges from fields. For example, in the late 1960s and early 1970s, the European Economic Community provided support to remove fruit trees from Streuobst systems in Germany (systems where fruit trees were traditionally grown on agricultural land undersown with crops or managed grassland) (Herzog 1998). These incentives have been removed, however agroforestry systems have continued to be excluded from CAP support (Lawson, Dupraz et al. 2002).

For example, from 1992 to 2003, farmers were able to receive arable area payments for fields growing cereals, oilseeds and protein crops, but areas of trees inside such agricultural parcels were excluded (Article 5(1)(a) of Regulation (EC) No 2419/2001). Only pasture or fodder areas with a density of less than 50 trees per hectare could be eligible for environmental reasons. In France, agroforestry plots were initially non-eligible. They finally became eligible in 2001 (including areas of trees), but only for a density of less than 50 trees (Liagre and Dupraz 2008) (Circulaire DPEI/SPM/C2001-4008 du 2 mars 2001). Similarly in the UK, the criteria for “set-aside” subsidies specified a minimum cropping width of 20 m, which is not possible in some alley-cropping systems (Burgess, Incoll et al. 2003). These presumptions against the role of trees in arable and pasture systems helped to accelerate the removal of trees, which was already occurring due to disease, and the increase in farm machinery size (therefore requiring more space in the fields).

The 2003 reform of the CAP introduced the SFP scheme in which eligible land is attached to a decoupled payment, regardless of the crop grown or the presence of livestock. However the general presumption remains that such payments cannot be made for areas with a tree density greater than 50 trees per hectare. For example, the introduction of single farm payments in the UK, initially led to many orchard farmers removing trees from their farms (Vidal 2004). The benefits of integrating trees with agricultural systems are now recognised by agricultural policy makers. In France, the eligibility of agroforestry in the first pillar has been modified in 2006 and in 2010 to allow total eligibility of the agroforestry plot when the density is below 200 trees/ha (Angeniol and Liagre 2010).

Since 1992, the second pillar of the CAP has provided support for afforestation (e.g. regulation 2080/1992). But there was a tendency for governments to only provide grants for high density tree planting. Under European support, farmers would only receive full rates of afforestation grants if the poplars were planted at a density of 1100 trees per hectare, whereas many poplar tree systems were traditionally planted at densities of about 150 trees per hectare. This rule led to systems where farmers planted high densities of trees. Since 2003, national governments have been allowed to include the planting of agroforestry systems within their Rural Development Programmes. For example, under measure 222 of RDP, support can be granted for the first establishment of agroforestry systems on agricultural land (Council regulation 2004/0161). In addition, the presence of landscape features such as field margins, hedges and trees are recognised in nationally organised agri-environmental schemes.

In the European Commission proposition for the post-2013 RDP (2011/0282 (COD)), one of the measures concerns agroforestry systems. Under this measure, payments are foreseen "to cover the costs of establishment and an annual premium per hectare to cover the costs of maintenance for a maximum period of three years". However, in the proposition concerning the first pillar (2011/0281 (COD)), it is not clear whether agroforestry parcels enter into the definition of eligible agricultural area. The European Agroforestry Federation (EURAFF) recently made a proposition to include an official definition of agroforestry in the future regulation so that agroforestry would be eligible for pillar I payments.¹¹

¹¹ All the modifications to the EC proposition proposed by EURAFF are available at <http://www.agrooof.net/forum/viewtopic.php?f=5&t=3059>

2.4) Influence on landscapes of CAP support to innovation and competitiveness in farming

Axis 1 (improving the competitiveness of the agricultural and forestry sector) does not include measures directly related to landscape, but, by supporting the modernisation and the viability of farms, they help farmers to carry out activities that are potentially linked to the existence of landscapes in rural areas (European Commission DG Agriculture and Rural Development 2011a).

Most Axis 1 measures support farm income and therefore contribute indirectly to rural landscapes through farm maintenance. More specifically, measure 121 (Farm modernisation) and measure 125 (Improving and developing infrastructure related to the development and adaptation of agriculture and forestry) help farmers to bear the cost of investments for modernisation of the holding. Investment support is granted for investments that respect the Community standards. This can include support for investments to improve the environmental performance of the agricultural holding. When the support is directed towards investment in machinery, it can potentially have a detrimental influence on landscapes: farmers have an incentive to increase plot size, rectify their geometry, and to reduce the number of fixed elements in order to enable the use of machinery and increase the economic efficiency of the farm. Illustration 7 supports the idea that farm machinery is perceived as part of agricultural landscapes.

Illustration 7: Farm machinery
© 2012 Randal Birkey Illustration



"Greenhouse parks", where several large greenhouses are clustered on the same site, is a good example of conflict between innovation –that can be supported by Axis 1 measures- and aesthetic influence on landscapes. These parks enable producers to reduce production costs by sharing infrastructure such as energy, water and gas facilities but they severely impact the aesthetic of the surrounding landscapes (Rogge, Nevens et al. 2008). Due to the short lifespan of crops produced in greenhouses (fresh fruit, vegetables and flowers), the holdings are often located in close proximity to large population centres and key markets, therefore creating a rural-urban conflict.

Training and advice measures give support to farmers who make use of advisory services to improve their scientific knowledge and education on farming techniques and sustainable use of natural resources, including the maintenance and enhancement of landscapes (measure 111 –Vocational training, information actions, including diffusion of scientific knowledge and innovative practices for persons engaged in the agricultural, food and forestry sectors-, measure 114 – use by farmers and forest holders of advisory services- , measure 115 – setting up farm management, farm relief and farm advisory services, as well as forestry advisory services-) (European Parliament 2011).

Measure 132 (supporting farmers who participate in food quality schemes) and measure 133 (supporting producers groups for information and promotion activities for products under food quality scheme) encourage innovation in food quality.¹² Farmers benefit from the EU origin certification schemes as they contribute to increase consumers' perception of products' quality. By supporting sustainability and profitability of farming, these schemes reduce the risk of land abandonment, and the associated closure of landscape. Moreover, food quality schemes have the potential to influence landscape more directly as product specification must include not only the description of the agricultural product, but also the definition of the geographical area (European Commission 2007). In some cases, landscape elements -such as soil type, topography, vegetation etc, as well as climate/microclimate- can influence the final product. The specification must specify and justify the link between the landscape and the product, and show how the specific characteristics of a particular region influence the product. Including these landscape elements in the product specification can therefore encourage farmers to take actions for landscape conservation, so that they conserve the benefits of product certification.

Illustration 8: European certified food products

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Mountain of cheese
© Jonelle Summerfield



¹² The EU food quality policy includes three schemes to promote and protect the names of quality agricultural products and foodstuffs: PDO (protected designation of origin) covers agricultural products and foodstuffs which are produced, processed and prepared in a given geographical area using recognised know-how; PGI (protected geographical indication) covers agricultural products and foodstuffs closely linked to a given geographical area, i.e. at least one of the stages of production, (processing or preparation) takes place in this area; TSG (traditional speciality guaranteed) highlights traditional character, either in the composition or means of production.

The French ministry of agriculture published a report in 2006 which presents the measures implemented in PDO and PGI areas in France with a direct or indirect influence on landscapes (Ministère français de l'agriculture et de la pêche 2006). For example, for vineyards and fruit trees, the specification of authorized variety, density and pruning rules influences the visual aspect of landscapes by changing the colours. For the Saint Marcellin cheese certification, the geographical area is defined by landscape features: polyculture in foothills and windy areas. Above all, it is specified that these landscape features enable a good lactic curd of cow milk to be obtained. The Beaufort PDO cheese promotes feeding cows with grassland in high pastures. Peyrache-Gadeau and Perron (2010) analyze the contribution of agriculture and cheese production to the creation of the landscape in the region of Beaufortain, France. This region is globally characterized by a landscape without fallow land and a clear-cut delimitation between pastures and forests, with a strong agricultural presence on the steepest slopes. Iconic elements of Alpine mountain society (typical stepping of fields, Alpine chalets, evident diversity of nature and a preserved architectural heritage) are linked to the existence of dynamic agricultural activities based on the system of cheese production. The latest developments in farming practices in the region, due to mechanisation, increase in farm size and decrease in number of holdings, are contributing to alteration of the landscape, with abandonment of the steepest parcels and the closing of the intermediary zone between pastures and forests, placing the typical landscape of the region at risk.

This relationship between rural landscapes and food quality schemes is captured in the Agri-Environmental Indicator 28 "Landscape state and diversity" (currently under development)¹³. AEI 28 is based on three sub-indicators: component 1 - the dominance and internal structure of the rural-agrarian landscape in the context of the wider landscape matrix; component 2- the hemeroby state (or degree of naturalness) which shows the distance from the natural state due to human (agricultural) activities; component 3- the interest and perception that society has for the rural-agrarian landscape. The last component is a linear combination of three indices: 1) Quality products, including food and spirits under the Protected Denomination of Origin and Protected Geographical Indication schemes, and wines under the Vin de Qualité Produit dans des Régions Déterminées (VQPRD) scheme; 2) Tourism in rural areas; 3) Agricultural areas in protected and valuable sites. The index for Quality food and wine is calculated from PDO and PGI products linked to landscape state and diversity¹⁴, and VQPRD wines' data¹⁵. The selection of PDO and PGI products linked to landscape state and diversity is based on the following criteria: 1) the product itself creates a specific landscape (i.e. vineyards, olive groves, etc.); 2) the production area is characterized by a particular landscape (i.e. montados, bocages, alpine meadows, maquis, etc.); 3) production is explicitly related to the preservation of the landscape's characteristics; 4) production is the result of traditional management of the rural landscape. A geo-database of the spatial distribution of selected PDO and PGI products is created at NUTS3 level, according to the information on the production areas provided by producers. Then, the number of different certified products per NUTS2 region is calculated.

¹³ EU has adopted a set of 28 agri-environmental indicators (AEI) in order to portray agricultural production systems, farm management practices, pressures and risks to the environment and the state of natural resources (Communication "Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy" (COM(2006) 508 final)). One objective of these indicators is to track the integration of environmental concerns into the CAP.

http://ec.europa.eu/agriculture/envir/indicators/index_en.htm

http://epp.eurostat.ec.europa.eu/portal/page/portal/agri_environmental_indicators/introduction

¹⁴ selected from the DOOR database <http://ec.europa.eu/agriculture/quality/door/>

¹⁵ extracted from <http://ec.europa.eu/agriculture/markets/wine/prod/inventaire.pdf>

2.5) Influence on landscapes of CAP support to rural quality of life

Axis 3 (improving the quality of life in rural areas) concerns actions helping rural stakeholders to carry out activities that are potentially linked to the existence and attractiveness of landscapes in rural areas (European Commission DG Agriculture and Rural Development 2011a).

Measures of Axis 3 supporting the diversification of on-farm activities (measure 311 – diversification into non-agricultural activities, measure 312 – support for the creation and development of micro-enterprises-, measure 313 –encouragement of tourism activities-) and the maintenance and development of services and actions in rural areas (measure 321 –basic services for the economy and rural population-, measure 322-village renewal and development-, measure 413 –local development strategies. Quality of life/diversification-) ensure the maintenance of farmers and their families in rural areas. It bolsters farm incomes in regions where there are few other economic activities. Doing so, it guarantees the maintenance of farmed landscape and reduces the risk of land abandonment and the disappearance of open landscape with the encroachment of bracken and scrub.

An example of farm activities' diversification influencing the visual aspects of rural landscapes is renewable energy production. In regions of low agricultural productivity and high potential for renewable energy production, farmers can be tempted to install or rent their land for the installation of solar panels and windmills. In Andalusia, falling prices for agricultural products, changes in the region's agricultural policy and restrictions to the agro-foodstuff sector have been decisive in the expansion of solar energy (Prados 2010). Production of renewable energy has been encouraged by the EU Energy policy (European Commission 1997), without coordination with the EU agricultural policy, while the risk of marginalization or abandonment of agriculture is non-negligible in those areas where payments offered for land rental and energy production are much more attractive than revenues from crop growing. Even if the opinion on the visual impact on landscape of windmills and solar panels is not necessarily negative (Thayer and Freeman 1987; Wind Focus 2003; Wolsink 2007), changes resulting from the implementation of renewable energy plants in the territory will change the way the landscape is perceived as a symbol of the European natural and cultural heritage (Council of Europe 2000).

Illustration 6: The visual impact of wind farms

Halse, Bornholms amt, Denmark

© European Commission Audiovisual service, DG Regional policy Photo library



Man-made features are among the most important elements of the perceived visual quality of the landscape (Arriaza, Cañas-Ortega et al. 2004). Traditional farms and buildings, as well as craft activities' maintenance, creates aesthetic value for rural landscapes (European Commission DG Agriculture and Rural Development 2011a). For example, Tempesta (2010) found that some elements of the historical landscape (villas and traditional farm buildings in particular) can increase the appreciation of the agrarian landscape for respondents in the Veneto region (Italy). Moreover, the historic character and cultural heritage of farmed landscapes make a fundamental contribution to rural economies, though their impact on tourism for example.

Conservation and integration of rural buildings play a crucial role in landscape management (Torreggiani and Tassinari 2012). Current Rural Development Programmes in Ireland, Belgium, Germany, the Netherlands, Sweden and the UK have long included or are developing measures to conserve and enhance landscape and cultural heritage, either through integrated multi-objective agri-environmental schemes under Axis 2; through Axis 3 measures related to use of heritage to support tourism, enterprise or village renewal; or through community-based LEADER initiatives (Axis 4) (Consilium, Nostra et al. 2010). Measure 323 for conservation and upgrading rural heritage can be used to fund large scale projects including landscape-scale ecological infrastructure, studies and plans. One of the most common actions currently supported is the development of management plans for Natura 2000 sites (Cooper, Hart et al. 2009). Measures 412 (Local development strategies- Environment/Land management) and 413 (Local development strategies- Quality of life/Diversification) can support local strategies targeted towards landscape conservation. For example, the French local institution in charge of agriculture in Deux Sèvres (Chambre d'agriculture) offers a three-day training course, co-financed by LEADER, to farmers willing to improve the visual aspect of their farms (La Nouvelle République 2012). In addition, some initiatives not supported by the CAP, have been launched in some Member States to make farm buildings more attractive. As an example, a study financed by the Countryside Agency and English Heritage has been conducted in order to investigate the character, management and threats to the farm buildings in rural areas in England (Gaskell and Owen).

Illustration 7: Traditional farm buildings

Gerersdorf, Austria © European Commission Audiovisual service, [DG Regional policy Photo library](#)



3. What influences on landscape can we expect from the EC proposition on post-2013 CAP?

The European Commission proposition for the post-2013 CAP was published in October 2011 (2011/0280 (COD) and 2011/0282 (COD)). While this proposal will certainly evolve until its final approval at the end of 2013, it is interesting to draw some intuitions of what the consequences of the current proposal on agricultural landscapes may be. Most of the existing literature on ex-ante impact assessments of the proposition for CAP post-2013 does not focus on the potential impacts on landscapes, but rather on the environmental impacts (farmland biodiversity, greenhouse gas emissions) and economic impacts (production, prices and farm incomes) (European Commission 2011; Hart and Baldock 2011; PBL 2012; van Zeijts, Overmars et al. 2012). Nevertheless, some potential influences on landscape are presented here.

3.1) Pillar I: the greening

Proposed changes to pillar I concern a reform of cross compliance requirements and a new design for direct payments. 'New good agricultural and environmental condition' (GAEC) would be added to cross compliance, and some management conditions that have been proved to have counterproductive effects would be removed –list unknown at the date of publication of the report- (Alliance environnement 2007). The most prominent change compared to the CAP 2007-2013 is the introduction of a greening component to pillar I. Thirty percent of direct payments would now be tied to environmental conditions, in order *"to ensure that all farms deliver environmental and climate benefits through the retention of soil carbon and grassland habitats associated with permanent pasture, the delivery of water and habitat protection by the establishment of ecological focus areas and improvement of the resilience of soil and ecosystems through crop diversification"*.¹⁶ In the proposition, the greening measures in pillar I have an annual, non-contractual basis and apply to all EU farmers in a generic way. There is a clear distinction from the rural development measures in pillar II, which are based on multi-annual, location-specific contracts that are targeted at specific priorities (see section I.3.2) (Westhoek, van Zeijts et al. 2012). Even if the prime objective of greening is environmental, the measures are also likely to have an influence on the aesthetic value of landscapes.

Crop diversification

The crop diversification measure would oblige farmers to grow at least three different crops, with the largest crop covering no more than 70% of the farm holdings' area and the smallest no less than 5%. The legislative proposal does not promote crop rotation or specific combinations of crops, as the latter could be perceived as production support and hence distort trade. This measure can favourably influence landscapes as crop diversity is a landscape characteristic valued by society (Arriaza, Cañas-Ortega et al. 2004). As most arable farmers already grow three or more crops and meet this requirement, the EU-wide effects of this measure will be limited. It is estimated that the measure would only impact around 2% of EU arable areas (European Commission 2011). The impact would therefore be restricted to specialised agricultural areas currently predominantly covered by

¹⁶ Organic farms do not have to comply with these conditions to be eligible for payment. Agricultural areas that have also been designated as nature areas under the Birds and Habitats Directives have to comply, unless the measures interfere with Natura 2000 targets.

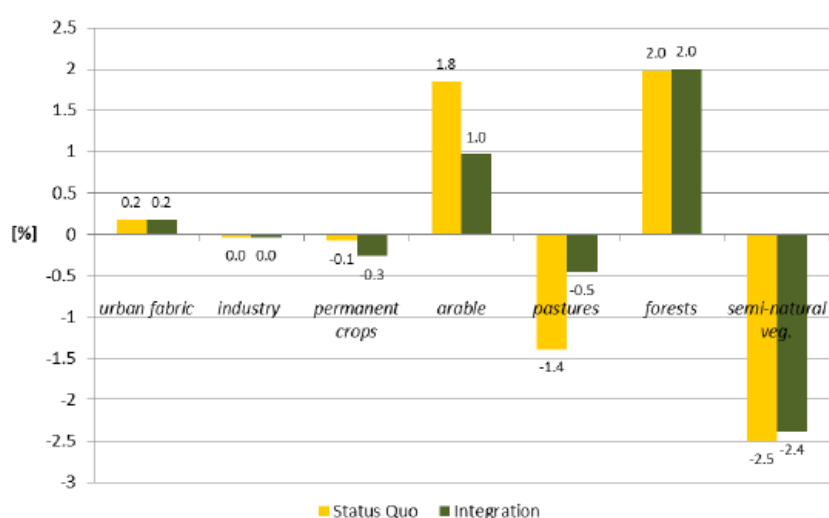
mono-cultures (Westhoek, van Zeijts et al. 2012). Illustration 8 represents the perceived role of crop diversification for the mosaic pattern of landscape.

Permanent grassland maintenance

The permanent grassland maintenance requirement introduced in the EC's proposition for the CAP post-2013 will replace the GAEC standard that ensures the protection of permanent pasture. It prohibits the conversion to arable land of grasslands that have not been reseeded for at least five years. Individual farmers would be allowed to convert up to 5% of their reference area, whereas national limits under current cross compliance would be defined by individual Member States and would have no direct effect on individual farmers.

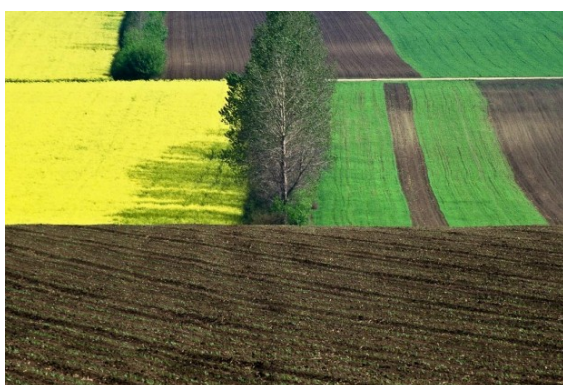
This measure aims to act as a resistance against the conversion of grassland into arable land and the associated detrimental influence on the landscape's naturalness. FAO (Food and Agriculture Organization) data suggest a 12.8% decrease in the area of grassland in Europe between 1990 and 2003 (FAOSTAT 2006). Eurostat 2011 data show that permanent pastures remained nearly stable at EU level between 2003 and 2007 (+0.63%) (Figure 5). An ex-ante assessment of a range of environmental impacts resulting from the implementation of greening at the horizon 2020 was realized by JRC-IES using the Land Use Modelling Platform (LUMP)¹⁷ (Lavalle, Baranzelli et al. 2011). They compare the Status Quo scenario, which represents the current socio-economic and environmental trends with existing policy provision maintained and the Integration policy option, which integrates specific greening measures (ecological focus area, maintenance of permanent pastures and separate payment for Natura 2000 areas). For EU-27, both simulations estimate a slight decrease in pastures, but the reduction is less significant in the Integration policy option (Figure 9). This difference is particularly evident in Ireland, Greece and Romania. They found that the share of the total agricultural area occupied by pastures is, in general, slightly higher in the Integration policy option than in the Status Quo scenario - approximately 21% and 20%, respectively in EU27. This overall trend is due to the fact that under the Integration policy option the greening measure 'maintenance of permanent pastures' enhances the presence of this land cover.

Figure 9: Net changes (%) in EU 27 from 2006 to 2020 per land use/cover



¹⁷ At the core of the LUMP is the EUCS100 model operating at 100 metres spatial resolution. It is based on the dynamic simulation of competitions between land uses. Its spatial allocation rules are based on a combination of land demand, overall suitability, neighbourhood characteristics and scenario/policy-specific decision rules. It combines the top-down allocation of land use/cover drivers at national/regional level for all EU Member States with a bottom-up determination of conversions for specific land use transitions.

Illustration 8: The role of crop diversification for the mosaic pattern of landscape



1. Mondseeland Austria © Dittl Bacher, ENRD 2012

2. Le pesche in fiore © Silvio Carrieri, ENRD 2012

3. Fence, Pogány, Hungary © Denes Baracs, ENRD 2012

4. Fields! © Alexandra Lüders, ENRD 2012

5. Farben und linien, Sulzbach region Oberpfalz nord © Ohann P. Gebhardt, ENRD 20126

6. Monoculture © Kelly Neidig

1
2
3
4

5
6

The impacts of the greening measures on the total grassland area may be positive, but would probably be limited. Indeed, according to the Impact Assessment CAP towards 2020 (SEC(2011) 1153 final/2), the area with an opportunity cost to maintain grassland corresponds to only 8% of the total potentially eligible area. 84% of farms would not have any opportunity cost to maintain permanent grassland (either because they have no permanent grassland or because no alternative is detected due to the low soil quality of some of these pastures). Therefore, even in the absence of greening, only a small part of the grassland area is likely to be converted into arable land (European Commission 2011). Moreover, the impact may be limited if farmers anticipate the coming regulations by ploughing their permanent pastures (which is allowed for 2012 and 2013 – before the reference year 2014), in an attempt to avoid the greening measure of having to maintain permanent grassland. (Westhoek, van Zeijts et al. 2012).

The rationale for the maintenance of existing permanent pasture is primarily environmental (protecting farmland biodiversity, enhancing carbon sequestration in soil and limiting soil erosion). Nevertheless, this measure is also likely to influence the aesthetic value of landscapes. This greening measure can benefit the maintenance of grazed landscapes across Europe and favour landscape diversity. In their estimation of EU citizens' willingness to pay for EU landscapes (meta-analysis), Ciaian and Gomez y Paloma (2011) found that the estimated per hectare average value of EU agricultural landscape is higher for grassland and permanent crops than for arable land (200 Euros/ha and 117 Euros/ha respectively).

Ecological focus area (EFA)

Ever since set-aside as a production control mechanism was abolished, a number of measures have been proposed to replace it, in order to continue delivering the environmental benefits that set-aside provided, often inadvertently (Hart and Baldock 2011). The third condition of greening imposes a minimum of 7% of "ecological focus areas" on all eligible arable land per farm – except permanent grassland and farms with less than three hectares of arable land. The Commission proposals suggest that Ecological Focus Areas could include land left fallow, terraces, landscape features, buffer strips and (certain) afforested areas (Article 25(2)(b)(ii)). The more permanent and in-situ traditional features which could form EFAs, such as hedgerows, stonewalls, terraces and infield trees, have great potential to positively impact landscapes, particularly within intensive arable and permanent crop areas, as they help to provide structure and variation within the landscape (Allen, Buckwell et al. 2012).

The individual farmer has a large degree of freedom in implementing this requirement, including annual changes in the location of the Ecological Focus Areas. Therefore, there is the risk that farmers with small ecological focus areas could rent such areas from farmers in other locations, or even rent parcels of land from non-farmers. This would render the whole measure almost ineffective (PBL 2012). In the areas with extensive farming systems, the ecological set-aside may lead to increased pressure to produce more food on the remaining 95% of the arable land, in order to compensate the production losses. This could lead to some conversion of grassland into arable land and therefore create a contradiction with the objective of the second requirement of greening (maintenance of permanent pasture) (van Zeijts, Overmars et al. 2012). Overall, the extent to which the EFA measure can meet its objectives and impact landscapes will depend on a number of factors such as their location, the types of land and features that can be considered as EFA, the balance between land left fallow and other types of EFA land; the distribution in space of EFA, for example at the parcel level or farm level; the management requirements, including the controllability and costs for farmers; and the link with pillar 2 measures (Allen, Buckwell et al. 2012).

One suggestion to increase the environmental and agricultural benefits from ecological focus areas is to define the ecological focus requirement according to the share of the agricultural surface beneficial for insect habitation (Association Française de l'Arbre et de la Haie Champêtre 2011). The Beneficial Insect Habitat (BIH) can be calculated by taking into account the potential colonization territory of beneficial insects. It is equal to an area 60 m wide along a hedge, wood edge or watercourse, or around a pool (high-diversity continuous elements) and 30 m from an isolated tree, agro-forestry tree, alignment, meadow orchard or dry stone wall (low-diversity continuous elements). Taking into account the BIH will impact the distribution of trees and fixed landscape elements in a field and therefore have stronger impacts on landscape.

Illustration 12: Trees as ecological focus areas
Wels-Land Oberösterreich © Rudolf Hirt, ENRD 2012



To summarize, the impact on landscapes of the different greening requirements are mostly unknown, however two arguments can be put forward. First, according to the available impact assessments, greening is likely to have only a small impact on farming practices; second, the greening requirements are not focused on landscapes and therefore will only have small indirect effects on landscapes. Overall, it is envisaged that the main impact of CAP greening will be to provide further incentives to keep marginal lands in production, as well as continue farming in extensively managed marginal areas, often species-rich HNV farmland, thereby potentially offering a viable economic alternative and preventing land abandonment (van Zeijts, Overmars et al. 2012).

3.2) Landscape conservation in the new Rural Development Policy

While the long-term strategic objectives of the Rural Development Policy post-2013 are left unchanged (competitiveness of agriculture, the sustainable management of natural resources and climate action and the balanced territorial development of rural areas), six EU-wide priorities have been defined to further specify these broad objectives: 1) innovation; 2) competitiveness and farm viability; 3) food chain organization and risk management in agriculture; 4) restoring, preserving and enhancing ecosystems dependent on agriculture and forestry; 5) resource efficiency for a low-carbon and climate-resilient economy; 6) socio-economic development in rural areas. Priority 4 includes a focus on "restoring and preserving the state of European landscapes".

The list of individual measures of the Rural Development Programmes has been reviewed to better address these priorities (Table 5). Among these measures, two directly mentioned landscape management (article 21 and 29), while others can have side-effect impacts on landscapes. As these measures are not very different from the ones in RDP 2007-2013, we refer to the explanations provided in section 2 to describe the potential influence on agricultural landscapes of the different measures.

Table 5: List of measures of the Rural Development Programs – proposition 2011/0282 (COD)-

Measure		Specific target on landscape	Non-targeted influence on landscape
<i>Article 18 Investment in physical assets</i>	Support under this measure shall cover investments which concern <u>infrastructure</u> related to the development and adaptation of agriculture (e.g. access to farm and forest land, land consolidation and improvement, energy supply, water management). It can also cover non productive investments linked to the achievement of <u>agri and forest environment commitments</u> , biodiversity conservation status of species and habitat as well as enhancing the public amenity value of a Natura 2000 area or other high nature value area to be defined in the programme.		X (See I. 2. 4)
<i>Article 19 Restoring agricultural production potential damaged by natural disasters and catastrophic events and introduction of appropriate prevention actions</i>	Support under this measure shall cover investments in preventive actions aimed at reducing the consequences of probable <u>natural disasters</u> and catastrophic events, as well as investments for the restoration of agricultural land and production after such disasters.		X
<i>Article 21 Basic services and village renewal in rural areas.</i>	"The development of local infrastructure and local basic services in rural areas, including leisure and culture, the renewal of villages and activities aimed at the restoration and upgrading of the cultural and natural heritage of villages and <u>rural landscapes</u> is an essential element of any effort to realise the growth potential and promote the sustainability of rural areas. Support should therefore be granted to operations with this aim. [...] Support under this	X (See I. 2. 5)	

	measure shall cover in particular studies and investments associated with the maintenance, restoration and upgrading of the cultural and natural heritage of villages and rural landscapes, including related socio-economic aspects"		
<i>Article 23 Afforestation and creation of woodland</i>	Support shall cover the costs of establishment and an annual premium per hectare to cover the costs of maintenance, including early and late cleanings, for a maximum period of ten years.		X (See I. 2. 3)
<i>Article 24 Establishment of agro-forestry systems</i>	Support shall cover the costs of establishment and an annual premium per hectare to cover the costs of maintenance for a maximum period of three years.		X (See I. 2. 3)
<i>Article 25 Prevention and restoration of damage to forests from forest fires and natural disasters and catastrophic events</i>	Support shall cover the costs of the establishment of <u>protective infrastructure and prevention activities</u> against fire or other natural hazards; as well as the costs of <u>restoring forest</u> potential damaged from fires and other natural disasters including pests, diseases as well as catastrophic events and climate change related events.		X
<i>Article 26 Investments improving the resilience and environmental value of forest ecosystems</i>	Investments shall be aimed at the achievement of <u>commitments undertaken for environmental aims or providing ecosystem services</u> and/or which enhance the public amenity value of forest and wooded land in the area concerned or improve the climate change mitigation potential of ecosystems, without excluding economic benefits in the long term.		
<i>Article 29 Agri-environment-climate</i>	"Agri-environment-climate payments should continue to play a prominent role in supporting the sustainable development of rural areas and in responding to society's increasing demands for environmental services. They should further encourage farmers and other land managers to serve society as a whole by introducing or continuing to apply agricultural practices contributing to climate change mitigation and adaptation and compatible with the protection and improvement of the environment, <u>the landscape and its features</u> , natural resources, the soil and genetic diversity."	X (See I. 2. 1)	
<i>Article 31 Natura 2000 and Water framework directive payments</i>	Support under this measure shall be granted annually and per hectare of UAA or per hectare of forest in order to compensate beneficiaries for costs incurred and income foregone resulting from disadvantages in the areas concerned, related to the implementation of the Habitat Directive (92/43/EEC), Bird Directive (2009/147/EC) and Water framework Directive (2000/60/EC).		X
<i>Article 32 Payments to areas facing natural or other specific constraints</i>	Reduce land abandonment, maintenance of farmed landscapes		X (See I. 2. 2)

Part II: Two examples of agricultural landscapes

In this section, two particular agricultural sectors are analyzed: olive production and livestock. The CAP support to these sectors is reviewed and its potential influences on landscape analyzed. With these two examples, different geographical scales and types of influences are covered. The olive sector is very concentrated in the south of Europe, while the livestock sector is widespread across Europe. The CAP support to olive plantations had a direct influence on land use (and therefore an influence on landscape visual aspects). Meanwhile, the CAP support to the livestock sector increases its profitability, and therefore indirectly affects land use and landscape.

1. Olive plantation and Mediterranean landscapes

Olive farming is a major land use in the Mediterranean regions, with around 5 million hectares and roughly 4% of the UAA (in 2007) (European Commission 2010). Spain, with 2.47 million ha, has the largest area under cultivation, followed by Italy (1.16 million ha), Greece (0.81 million ha) and Portugal (0.38 million ha). The EU produces 70% of the world's olives, and accounts for a similar share of global olive oil production (European Commission 2010). Olive production is the main source of employment and economic activity in many producing regions. It has also shaped the landscape in these countries over many centuries.

The EU olive oil policy has played an important role in the way in which the olive sector has developed. We first list the characteristics of olive production influencing landscape. Then, we review how the CAP support to olive production has evolved over time and its potential influence on landscapes.

The characteristics of olive plantations and their influence on landscapes

According to Fleskens (2007), areas where intensive olive monocultures have replaced the traditional mosaic landscape (including traditional olive orchards), biodiversity and landscape values have been substantially reduced. Nevertheless, Cohen et al. (2008) highlight the paradox of the olive tree landscape with the example of Sierra Magina in Andalucia. Although one would expect the landscape to be poor in terms of diversity and environmental value in the context of intensive monoculture, they found a high diversity of the flora growing below the olive trees, thanks to the diversity of individual practices in the management of olive growing. The main characteristics of olive production (and management) influencing the visual characteristics of olive grove landscapes are presented in Table 6. In Illustration 9 the diversity of olive grove landscapes influenced by their management is represented.

Table 6: Main characteristics of olive production influencing the visual characteristics of olive groves landscapes

Characteristics of olive production	Visual influence on olive groves landscapes
Specialisation (share of agricultural land covered by olive trees)	Olive trees can be isolated or form part of a diverse land use system, for example in combination with pastures, arable cultivation and vineyards. In contrast, olive plantations can dominate the landscape, forming vast monocultures in which the trees themselves are the only form of vegetation for the greater part of the year.
Soil cover	In the past in Spain, the soil below olive trees was often cultivated for the production of crops for non-farm use, such as barley, oats, chick-peas or vetch. Nowadays, the normal practice is simply to control spontaneous grasses and other vegetation by seasonal ploughing or harrowing, sometimes preceded by grazing or cutting. Soil erosion is a major problem associated with olive plantations, which has been exacerbated by the practice of keeping bare soils.
Tree density	Density can vary from 40-50 stems per ha in older Italian plantations to 1600-1800 stems per ha in the most intensive plantations in Spain.
Age of trees	Trees enter production after 10 years in the more intensive production systems (35 years in traditional plantations) and can produce until they reach 150 years in the more extensive production systems. The visual aspect is very different according to the age of the trees.
Presence of man-made elements	The presence of man-made elements can be perceived both as positive and negative. Terraces and walls are characteristics of traditional extensive olive production with significant landscape value. Meanwhile, the development of irrigation production on a large scale can have important environmental and landscape influences through the construction of reservoirs and the alteration of streams and rivers to provide water.

Source: authors' own elaboration

Illustration 9: Diversity of olive groves landscapes



Traditional olive groves in terrace, Cordoba, Spain
© Olexandr Nekhay (Arriaza and Nekhay 2010)



Intensive production, Cordoba, Spain
© Olexandr Nekhay (Arriaza and Nekhay 2010)



Erosion in olive groves, Cordoba, Spain
© Olexandr Nekhay (Arriaza and Nekhay 2010)



Abandoned olive groves, Cordoba, Spain
© Olexandr Nekhay (Arriaza and Nekhay 2010)



Century olds trees, Puglia, Italy
© Fabien Santini



"The ulivone", one of the largest and oldest olive tree in Europe, Canneto Sabino, Italy
© European Commission Audiovisual service

The following section describes how the CAP has influenced the olive sector and especially the characteristics of production and land management defined above.

Production support and intensification

The first regulation of olive oil production was established in 1966, with the creation of the Common Market Organisation (CMO) for oils and fats (Regulation (CEE) n° 136/1966). A specific policy was set for the European olive oil market, but, at that time, Italy was the only olive producer in the European Community. The implemented system aimed to encourage producers by means of a fair income, and to encourage olive oil consumption despite the lower prices of seeds' oils (Drogué 2006). The CAP market regime for olive oil was mainly based on production support. Large-scale producers (more than 500 kg of oil per year) received a subsidy in direct proportion to the oil they produced, whereas small producers (less than 500 kg) received aid per tree, weighted according to the average historical yields of their district. The small producers' scheme appeared to be arbitrary and vulnerable to fraud and was abrogated in 1998 (Beaufroy 2000). These production support measures were completed by a minimum price for producers, maintained by a combination of import restrictions and intervention buying. However, the market price was well above the intervention price in the 1990s, so the price support mechanisms had played a relatively insignificant role (Beaufroy 2000). The CAP market regime for olive oil also included a consumption subsidy paid to the processing sector and export subsidies.

While it is difficult to ascertain the exact role of the CAP olive regime in defining production patterns and the indirect effects on landscapes, certain influences have been identified (Beaufroy 2001; Agrosynergie 2009). The CAP has contributed to the evolution of olive production towards greater intensification, characterized by mechanisation and irrigation, an increase in the planting density, as well as a reduction in the number of varieties. Indeed, until 2004, the support system was based on volume produced, therefore encouraging the intensification of production in the short term (production with younger trees, increase in input use and suppression of soil cover). In the longer term, the system has also encouraged the establishment of new plantations (with high density and in monoculture), often at the expense of natural vegetation, thus destroying the most effective protection against erosion (Agrosynergie 2009). While production aid was limited by a maximum guaranteed quantity (MGQ) eligible for aid at EU level, as well as by national guaranteed quantity (NGQ) in each Member State, it had a very limited influence on quantities produced as no individual farmer had an interest in reducing his own production in the absence of certainty about what the others will do (Agrosynergie 2009). Moreover, production support clearly provided a very strong incentive for converting to irrigated production (Beaufroy 2001).

In theory, production support should benefit all types of production and all producing regions (Agrosynergie 2009). However, different patterns were observed in the different producing regions (Beaufroy 2001). In Greece and Spain, the introduction of this policy during the 1980s and 1990s coincided with intensification and increased planting and output in the main producing regions (whereas, prior to Spain's accession to the EC in 1986, olive farming was in decline in this country). Intensification and expansion processes were less pronounced in Portugal, where olive farming had been in strong decline for many years at the time of EC accession. In Italy, different circumstances seem to have applied. The CAP regime has been in place since the 1960s, but, because holdings are smaller on average, a large proportion of producers received aid on the basis of tree numbers, rather than real production (small producer scheme). Moreover, the agricultural economy tends to be more diversified and rural areas were generally not so dependent on olive production as equivalent areas in Spain and Greece. For these and other reasons, it seems that the CAP olive regime did not promote olive expansion and intensification in many parts of Italy on the same scale as in Spain and Greece (except Puglia where favourable conditions -e.g. availability of irrigation water- permitted the

development of modern intensive systems). Rather, in Italy, the CAP support helped to reduce the abandonment of small, traditional plantations, thus preventing the loss of certain environmental, landscape and social values.

With the accession of Greece (1981), and Portugal and Spain (1986), the EU was transformed from being a net importer to a net exporter and became the key player in the world trade of olive oil. It was clear that the rules laid down in the original regulation were no longer suitable. The European Commission reported on the need to reform the olive oil regime in February 1997. Subsequently, the first phase of reforms was put in place in 1998. It was designed as a transitional arrangement (1998-2001) but was later extended to the end of 2003.

The decoupling reform

In 2004 the olive and olive oil regime changed, with the integration of the support to olive farmers in the Single Payment Scheme (SPS) (Regulation (CE) n°864/2004).¹⁸ Under the new rules, entitlements were decoupled from current production (Agrosynergie 2009). Only Spain decided to support olive groves with specific environmental and socio-economic value through coupled support. Coupled support is now totally prohibited since 2010, apart from specific circumstances described in article 68 of regulation n°73/2009 (up to 10% of national ceilings can be used for coupled support to olive production). Greece, Portugal and Italy use this possibility to support the conservation of traditional olive plantations and high-quality olive groves (DS/2010/03 Implementation of Specific Support - Article 68 of Regulation (EC) No 73/2009).

Together with the decoupling reform, cross compliance was introduced in order to prevent the payment of support to producers whose practices damage the environment. Olive producing countries have listed the obligations farmers have to fulfil in order to be eligible for the full decoupled support. The so-called, Good Agricultural and Environmental Conditions, include erosion control measures, like cultivation along the contour line, minimum tillage, cover crops, maintenance of terraces, etc. (Graaff, Duarte et al. 2009). The requirements include, in particular, observance of obligations related to the Birds and Habitats Directives, the Nitrate and Groundwater Directives and the directive on the authorisation of pesticides. Farmers must also respect the national authorisation procedures for the use of water for irrigation, the maintenance of olive groves in good vegetative conditions and the rules about the grubbing-up of olive trees as defined by Member States (European Commission 2010).

Other support, besides decoupled payments, is available for the conservation of traditional olive plantations. There are few agri-environmental measures specific to olives but olive producers can get support for organic production, terrace maintenance (Spain), soil conservation measures (Spain), landscape and biodiversity conservation (Italy, Portugal), and support to less favoured areas (Agrosynergie 2009). The LIFE programme¹⁹ has also supported projects dealing with the environmental influences of both olive cultivation and olive oil processing (18 olive-related projects

¹⁸ With regulation (CE) n°864/2004, olive trees planted before 1st May 1998 were included in the SPS (before 31st December 2001 in Cyprus and Malta). Since 2008, all olive plantations are eligible for direct payments (regulation (CE) n°1182/2008), although only olive trees and areas registered under a system of airborne imagery known as GIS (geographic information system) are eligible.

¹⁹ The LIFE programme is the EU's funding instrument for the environment. The general objective of LIFE is to contribute to the implementation, update and development of EU environmental policy and legislation by co-financing pilot or demonstration projects with European added value.

have been co-financed since 1992) (European Commission 2010). These projects contribute to demonstrate the benefits and viability of a more sustainable olive sector.

Influences of the decoupling reform on olive production and associated landscapes

In theory, with the decoupling of farm payments from olive production, the market should become the main driver of production choices.²⁰ The CAP should therefore no longer influence planted surfaces and level of intensification of olive production. However, no lowering of the intensification of olive production has been observed. On the contrary, the lagged impact of measures taken before 2004 (production aids and RDP support) as well as external factors (increased labour costs, high selling prices and demand) have led to intensification after the decoupling reform (Agrosynergie 2009).

Direct payments do not interfere with market signals but they contribute to farm household income and can enable the maintenance of olive plantations in marginal regions where there is no other farming opportunity (therefore no opportunity cost). However, if the amounts of aid granted to the least profitable farms are too low to cover costs, these farms could give up their single payment entitlements and abandon their olive groves. This can reinforce the concentration of production in the more competitive zones, where production costs are lower (i.e. plains where the crop can be mechanised and irrigated) (Agrosynergie 2009).

The impact of olive grove abandonment on landscape will depend whether the trees are grubbed-up or not. It can be assumed that the practice of grubbing-up olive trees may be limited due to several factors: the cost of grub-up, the lack of agricultural alternatives in many areas where olives are grown, the strong cultural attachment to olives trees independent of their economic potential, and grubbing-up ban applied through the GAEC in Spain (on slopes >15%), Italy and Portugal. As landowners are encouraged to keep plantations in good condition but are not required to harvest the olives to receive the payments the occurrence of unharvested trees has increased, especially during the years when the price of olive oil was very low and that of fertiliser very high (Agrosynergie 2009). Unharvested plantations support a high diversity of wildlife (birds take advantage of the availability of olives when the plantations are not harvested) and conserve their landscape values (Beaufroy 2000).

There is evidence that the CAP support to olive production has influenced production patterns. However, because of the perennial nature of the olive tree and the structure of the sector (agricultural production is highly dependant on the coordination with the downstream industrial sector for transformation into table olives and oil), production does not evolve as fast as the regulatory and economic context. It is therefore not possible to observe the effects of the policy in the short term (Agrosynergie 2009). Moreover, many other factors external to the first pillar of the CAP have played a role in the olive sector's evolution, for example the very unusual market price situation in recent years (very high prices from October 2005 to May 2006 followed by a fall of up to 50% between 2006 and 2009) and the creation of a large number of PDO, PGI and TSD schemes for

²⁰ Intervention on the market is still possible within the current single Common Market Organisation (Regulation (CE) n°1234/2007). In the event of a serious disturbance of the market in the European Union or some of its regions, the Commission may authorise and subsidise private storage. The storage mechanism is used in particular when, for a long period of time, the average price recorded on the market is lower than a pre-specified intervention price. The storage subsidies are decided by tender, where producers and traders propose storing quantities for a number of days and request a certain amount of financial compensation, per tonne and per day. In February 2012, the European Commission decided to pay up to Euros20 million to subsidise the temporary storage of 100,000 tons of extra virgin and virgin olive oil. <http://www.oliveoiltimes.com/olive-oil-business/europe/eu-storage-aid-olive-oil-prices/24645>

olives. It is therefore not possible to disentangle the exact contribution of the CAP from other factors.

2. Livestock and extensive grazing landscapes

There is a wide range of livestock systems in Europe. In the EU-27 beef farms represent 48% of the total livestock units in the EU, with a UAA of 172.5 million hectares in 2007 (AND International 2010). Sheep and goat farming are minor agricultural activities, representing 3.6% of the total value of animal production in the EU-27 in 2010. However, in some Member States, sheep and goat farms cover a significant part of the agricultural area: 31% in the UK, close to 20% in Ireland, Spain, Romania and Italy (AND International 2011). The total livestock population has slightly decreased between 2003 and 2007 (-3.6%) (Figure 10).

Figure 10: Size of the main livestock populations EU-27

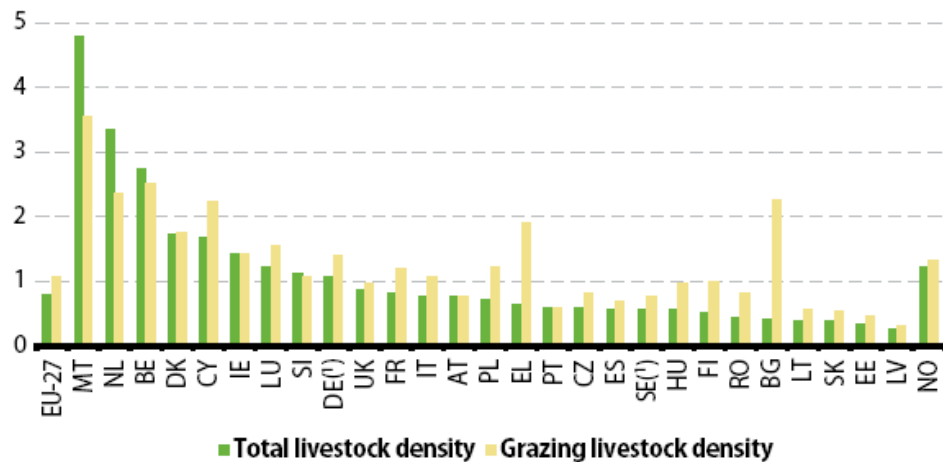
	2003	2005	2007	Δ 2007–03 (%)
	1 000 LSU			%
Cattle	67 010	65 439	64 929	– 3.10
Sheep	10 818	10 562	10 324	– 4.57
Pigs	38 220	37 359	37 494	– 1.90
Poultry	20 420	19 326	18 759	– 8.14
Other ⁽¹⁾	4 595	4 455	4 476	– 2.57

⁽¹⁾ Goats, equidae and rabbits.

Source: (EUROSTAT 2011)

For all these livestock sectors, there is a high degree of heterogeneity in the intensity of production, ranging from intensive indoor production systems to low intensity grazing systems. Livestock densities, i.e. the stock of animals per hectare of utilized agricultural area, are used as a 'proxy' of agricultural intensification. Figure 11 presents total livestock density aggregating all categories of animal (except goats), including battery (indoor) animals and all types of agricultural land. Figure 12 focuses on grazing animals and fodder area, and illustrates the share of agricultural area used for extensive grazing at the NUTS2 level. Both figures show a highly diverse situation across the EU. Nevertheless, it is interesting to draw a general pattern on the provision of landscape services by livestock production in the EU.

Figure 11: Stocking densities for livestock production

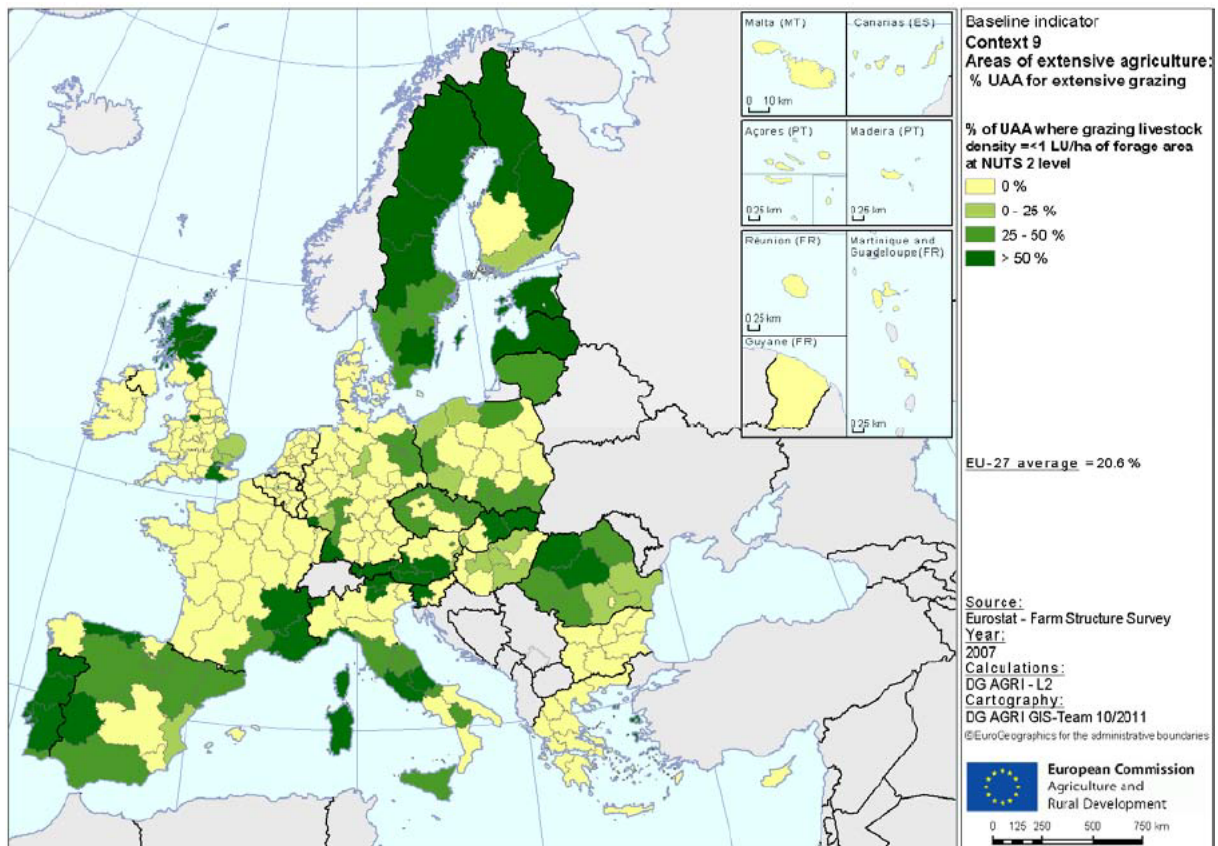


(*) Data on goats are not available (non-significant).

AT: Austria	EL: Greece	IT: Italy	PT: Portugal
BE: Belgium	ES: Spain	LT: Lithuania	SE: Sweden
DE: Germany	FI: Finland	LU: Luxembourg	SI: Slovenia
DK: Denmark	FR: France	LV: Latvia	SK: Slovakia
CZ: Czech Republic	HU: Hungary	NL: Netherlands	UK: Unites Kingdom
EE: Estonia	IE: Ireland	PL: Poland	

Source: (EUROSTAT 2011)

Figure 12: Share of UAA for extensive grazing



Source: (European Union Directorate-General for Agriculture and Rural Development 2011)

Livestock and landscape

Table 7 presents the type of practices in livestock production and their implications for landscapes.

On top of the increased environmental downsides generally associated with intensive livestock production (eutrophication of water bodies, soil erosion, loss of biodiversity, increase greenhouse gases emissions etc.), intensive livestock production is also associated with less valued landscapes. For example, Cooper et al. (2009) report that intensive indoor production systems for pig and poultry farming have detrimental influences on landscape, due to the presence of farm buildings and the spreading of manure. According to IEEP (2007), intensive production systems can have negative influences on landscape, for example, through increasing field sizes and removal of landscape features such as boundary features and small areas of woodland or wetland. The construction of additional buildings and associated infrastructure such as fencing, milking parlours, silage clamps and slurry stores can change the characteristics of the landscape, giving it a more 'industrial' character. The shift from grass-based systems to the use of maize as a fodder crop can also detract from the traditional character of the landscape. Colman (2002) confirms that intensification of dairy production results in dairy management practices becoming more uniform and less dispersed resulting in the loss of visually attractive mixed farming systems. On the other hand, neglect associated with the abandonment of dairying may lead to scrub encroachment that may simplify the structure of the landscape by displacing the open habitat mosaics associated with traditional farmland.

At the other end of the spectrum, low intensity grazing systems are critical to the maintenance of farmland of "High Nature Value" in Europe (Beaufoy and Cooper 2008). Low intensity livestock grazing can prevent the loss of open meadows and maintain field structures. The cultural and archaeological heritage is often well preserved in extensive systems because low stocking densities result in relatively little structural change. For example, hedgerows, field margins and drainage ditches along boundaries are often present in lowland beef and dairy systems (Cooper, Hart et al. 2009). In less intensively managed areas, extensive grazing in scrub and other woodlands contributes to prevent fires, that put the whole landscape at risk (Ashworth and Caraveli 2000). Cooper et al. (2009) have shown that extensive mixed arable/pastoral and extensive outdoor livestock and silvo-pastoral systems have the greatest potential to provide high-quality agrarian landscapes, since they have the largest number of farming practices potentially beneficial to landscapes. Despite the evidence on the importance of extensive livestock systems for agricultural landscape conservation, these systems are nowadays threatened by a variety of changes in land use including conversion to arable farming (including energy crops), intensification of management, overgrazing, land abandonment, urban development or afforestation.

Table 7: Type of practices in livestock production and their implications for landscapes

Type of Practice	Landscape related Issues
Breed of Cattle Used in Production and size of herd	Breed choice impacts feed requirements and possible stocking density, with second-order impacts on landscapes.
Grassland Management	Continuous management of permanent pasture vs. ploughing and reseeding Exploitation of common land or transhumance (seasonal alpine grazing of semi-natural pastures)
Other Crop Management	Choice of forage crop; particular issues with forage maize which has displaced grass in sizable areas Crop rotation and soil management including cover on arable soils in winter
Landscape Management	Field size Retention and management of field boundaries and other landscape features Management of semi-natural vegetation, including scrub clearance Management of stock in woodland and agro-forestry systems Maintenance of drovers' roads Management of water: water quality protection if streams and rivers, irrigation infrastructure

Source: adapted from (Alliance environnement 2008)

Study on the visual impacts derived from a reduction in livestock

ELBEX (organisation for the beef and sheep meat industry in England) financed a study in 2011 to illustrate the likely visual impact over time on a number of landscapes in United Kingdom, arising from the fall in the profitability of beef and sheep farming, leading to a replacement of grassland farming with other land uses and a reduction in livestock numbers (Deane 2011).

Illustration 10: Likely future evolution of grazing landscape in UK (2011 to 2041)

Methodology: The overall objective was to raise greater awareness among stakeholders and the wider public of the potential issues involved in reducing or removing livestock. For this study, the consultants visited five sites and took panoramic photographs representing the quintessential characteristics of the current landscapes as "control images". A narrative describing the likely future evolution of each landscape, based on assumptions about the nature and consequences of a decline in beef and sheep numbers, was prepared. The consultants then developed additional photomontages to illustrate the visual impacts of these changes in year 3, year 10 and year 30. Illustration 10 presents the evolution of these five different environments in England typically grazed by beef cattle and sheep and in which these livestock play a major role in maintaining the distinctive environmental character.



Results: The different agricultural capabilities of the landscapes, and the potential of the land to be used for things other than beef and sheep farming, means that the 'trajectories' of change are different for each of the five locations.

- The Dartmoor common landscape (No. 5) currently has low landscape diversity and low land use intensity. By 2041, the intensity of use has fallen further with the virtual absence of any livestock grazing and the unsuitability of the land preventing any alternative uses. However, the gradual colonisation of the moorland by gorse and trees (including dark conifers which contrast with the light coloured grasses) has resulted in a more diverse or visually intricate landscape.
- The Exmoor landscape (No. 4) shows a similar trajectory towards reduced intensity of management on much of the land (for instance large hedgerows and many fields with lower levels of grazing) but increased diversity of uses (for instance horse grazing, outdoor keeping of pigs and poultry, forestry, energy crops and wind turbines). Both the No. 4 and No. 5 landscapes have become 'busier' and more complex.
- In contrast, the Vale of Pickering's (No. 2) mixed farmland is already much more diverse, with a range of different land uses, field boundaries, roads and settlement. It is also more intensively used, with relatively high stocking densities, together with cultivation for arable cropping, creating a more agriculturally productive landscape. By 2041, the replacement of grassland with larger blocks of arable crops, and the removal of many of the field boundaries and loss of hedgerow trees has created a simpler, less diverse and 'starker' landscape. However, the high agricultural capability of the land has enabled more intensive management, reducing the area of semi-natural habitats, giving the landscape a more heavily used look.
- The Romney Marsh landscape (No. 3) shows a similar trend, although it is both less diverse and less intensively used to start with. Again, it is the high agricultural capability of the land that allows the replacement of a relatively complex pastoral landscape containing significant areas of extensively used semi-natural vegetation with a simpler landscape dominated, to the exclusion of most other vegetation, by arable cropping.
- A third trajectory is shown by the North York Moors landscape (No. 1). Here, the replacement of the patchwork of pasture and meadows with large relatively amorphous blocks of woodland and bracken have obscured the patterns of hedgerows and stone walls, creating a less diverse landscape, but also one that has lower levels of active management and a high degree of natural colonisation.

Source: Land Use Change (2011) Landscapes without Livestock: Visualising the impacts of a reduction in beef and sheep farming on some of England's most cherished landscapes.

CAP support to livestock with potential influence on landscapes

From coupled payments to extensification premium

Historically, the CAP has exerted a significant influence over the majority of EU livestock producers. The Common Market Organisation was created in 1977 for beef and veal and in 1980 for sheep and goat, introducing support to the livestock sectors through coupled payments: the slaughter premium, the suckler cow premium, the special male bovine premium and the sheep annual premium. A goat premium was introduced later in 1985. Subsidies coupled directly to the production of certain types of livestock or feed crops, as well as price support, encouraged an increase in production. Coupled with technological progress, this led to significant changes within the livestock sector, towards more intensification. The pig and poultry sectors were never direct recipients of coupled production payments but have indirectly benefited from CAP support through the subsidised cost of feed linked to arable feed payments and through market interventions (Bartley, Hart et al. 2009).

Given the higher provision of public goods by extensive livestock production systems, the CAP has been progressively reformed in order to include a number of measures aiming to support extensive livestock production. Coupled payments were modified in the 1992 reform, which sought to stimulate less intensive livestock production methods in the beef sector. The Beef Special Premium and Suckler Cow Premium were to be paid on condition that farmers adhered to a stocking density of a maximum of 2 livestock units (LU) per ha of forage by 1996. Furthermore, an "extensification premium" was introduced giving farmers a supplementary premium if the stocking density was below 1.4 LU /ha. From 1997, the "super-extensification premium" was made available for farmers with a stocking density of less than 1 LU/ha. Following the same logic, regulation 2069-92 introduced quotas for sheep and goat production. Beside these premiums, additional payments were available for livestock farmers in Less Favoured Areas.

Although these measures might have seemed beneficial for the environment, the headage payments and the attached stocking density requirements are believed to have caused relatively limited changes in farming practices (Andersen, Rutherford et al. 2000). In the Agenda 2000 reform, the extensification premiums were redesigned in order to address these limitations. Member States were granted some flexibility to adapt the stocking densities qualifying for premiums to local conditions (environmental constraints in the EU, carrying capacity of grazing land and so on). Moreover, this redesign reduced the possibility of "paper-farm" (i.e. the reduction in the declaration of the herd sizes in order to comply with the stocking density rules). All cattle and sheep on the farm have now to be taken into account in calculating stocking densities, not just animals receiving premiums. Extensification premium payments were also significantly increased with the reform in order to compensate for the reduced intervention price. National envelopes were set in order to give Member States flexibility to compensate for regional differences in production and agronomic conditions.

Decoupled payment and cross compliance

Since the decoupling reform, farmers are not paid according to the number of animals, but according to the surface of their permanent pasture (except for sheep, goat and suckler cows for which coupled premiums are maintained in accordance with article 68 of Council Regulation 73/2009). This reform therefore suppresses the incentives to the intensification of livestock production.

However, it does not mean that decoupling necessarily leads to the extensification of livestock production systems (AND International 2010). Indeed, it has been observed that permanent pastures

remained almost stable after the decoupling reform at EU level (+0.63% between 2003 and 2007). This relative stability can be explained by the cross compliance requirements on maintenance of permanent pasture (see section I.2.1). Nevertheless, countries had very diverse experiences, as illustrated in Figure 5 (see section I.1.2 on cross compliance).

A limit to the extensification of livestock production is the definition of permanent pasture retained in the CAP. Non-herbaceous or ligneous pastures provide essential forage in many extensive livestock systems (shrubs and the fruits and leaves of trees are eaten by all livestock types), but these areas of pastoral land are not eligible for CAP support because ligneous pastures do not comply with the definition of permanent pastures.²¹ The support to livestock production on ligneous pastures can help to reduce the risk of land abandonment, disappearance of open landscape with the encroachment of bracken and scrub, and the associated fire risk, through the compulsory cross compliance requirement on land maintenance (European Forum on Nature Conservation and Pastoralism 2012).

Illustration 11: The importance of animal grazing for landscapes
Transhumance Shepherd with his flock in the Bargaului mountains Romania
© European Commission Audiovisual service , DG Regional policy Photo library



²¹ The Regulation 1120/2009 recognises that pastures with trees and shrubs present may be grazed and may be eligible for CAP payments, but the guidance published by the Commission states that if there are more than 50 trees per hectare on a parcel, this land should, as a general rule, be considered ineligible. Furthermore, the recommendation is to subtract features such as patches of scrub and hedges of over 2m in width from the eligible area of a pasture. Despite the EU rules allow Member States to make some adaptations to suit local circumstances (in accordance with the customary standards of the Member State or in view of specific environmental needs), many Member States choose to play safe and do not make use of the available “exceptions”. Ligneous pastures are eligible only in France, the UK and Spain. In the Commission’s proposed regulation on CAP direct payments for 2014-2020, the current category of “permanent pastures” is renamed in “permanent grasslands” and it is specified that “permanent grasslands may include other species suitable for grazing provided that the grasses and other herbaceous forage remain predominant”. The European Forum on Nature Conservation and Pastoralism proposes a redefinition of permanent pastures and the withdrawal of the criteria on permitted numbers of trees and size of hedges or patches of scrub in order for the extensive livestock producers to have full access to CAP direct payments (European Forum on Nature Conservation and Pastoralism 2012).

In more marginal areas, the financial support provided by direct payments can sustain a large number of small farms, a diversity of farm structures and the associated cultural landscapes. To the extent that direct payments allow those farms using local cattle breeds to remain viable, this will have retained the landscape and biodiversity benefits associated with the management of these cattle breeds, as well as supporting genetic conservation. Direct payments comprise only one out of a number of drivers influencing this production system. Specifically the following can be mentioned: extensification payments, agri-environmental scheme payments and LFA compensatory payments to maintain diversity of livestock production (for example by supporting less profitable small and/or part time farms in LFA).

Agri-environmental measures

Agri-environmental measures include support to extensive livestock systems that may be classified under the following typologies of measures "other extensification of farming systems", "diversification of crop rotations" and "management of landscape, pastures and HNV" (DG Agri Agri-environmental Indicator 01- Area under agri-environment support). As these measures involve other actions, it is not possible to have an accurate estimation of the uptake of the specific measures affecting the extensification of livestock for the programming period 2007-2013.²²

One example of these measures is the grassland payment implemented in France (Prime à L'Herbe Agro-Environnementale PHAE2), which rewards farms that maintain a large proportion of grassland under low intensity management. The requirements of the scheme are: between 50-75% of the UAA must be grassland, stocking density should be in the range 0.35-1.4 LU/ha; 20% of the surface should be maintained as biodiversity features; fertiliser use has an upper limit of 125 N/90 P/160 K kgha-1 and herbicide use is not permitted. The payment is 76 Euros/ha/year for a 5-year contract with a maximum of 7600 Euros/year/farm.

Member States can also offer agri-environmental support for the rearing of local livestock breeds which are at risk of extinction, in the category "genetic resources" of RDPs 2007-2013. A community programme was established by Council Regulation (EC) No 870/2004 to complement and promote the work undertaken in the Member States for the conservation, characterisation, collection and utilisation of genetic resources in agriculture. Precise details are left to the discretion of Member States, but the general qualifying principle is that livestock should be protected for environmental maintenance, or if they are threatened with extinction due to poor, or potentially poor, economic performance. In Italy, a number of regions have introduced these measures within their Rural Development Programmes. In Emilia Romagna, the "Mora Romagnola" (a breed of pig from that region) has been saved from extinction through CAP support. Similar success has also been seen in the Piemonte Region, where the "sempione" goat has been saved (Bocci and Chiari 2009). While these measures do not focus on landscapes, they do have indirect influences as the diversity of animal breeds is an important but neglected part of the landscape (Evans and Yarwooda 1995). On top of maintaining genetic biodiversity, traditional or local breeds are usually better able to exploit coarser and more natural vegetation than their modern counterparts (Gandini and Villa 2003). Maintaining breed diversity can therefore improve the environmental services provided by grazing, as well as contributing to the landscape mosaic (Yarwood and Evans 2003).

²² However, for the previous programming period 2000-2006 and based on the study by Oreade-Breche (2005) it can be reported that 181 agri-environmental measures (10% of the total in the EU-15) are under the typology of "crop diversification, maintenance of pasture-land, conversion of arable land to grassland and extensification".

Conclusion

Overall, the influence of the CAP on landscapes is multifaceted. On one hand, the CAP is acknowledged to have contributed to the modernisation of European agriculture and its intensification, which was translated into landscape homogenization, by the rationalisation of farm size and structure and the consequent loss of many traditional features (hedges, trees, field margins and wet areas) (Brouwer and Lowe 2000). Payments coupled to quantity produced or surface have given incentives to farmers to increase their farm size, and grow mainly eligible crops, therefore increasing arable crops and reducing crop diversity. CAP support has also contributed to the intensification of livestock production, with a strong reduction in low intensity grazing systems which are critical to the maintenance of some cultural landscapes. With the introduction of decoupled payments in 2003, CAP support was expected to no longer interact with farmers' production decisions and therefore to reduce its influence on agricultural landscapes. However, the influence on the landscape mosaic has been reduced because land use remains largely unchanged compared to the period with coupled payments (Brady, Kellermann et al. 2009).

On the other hand, through direct payments and the Less Favoured Area scheme, the CAP has promoted the maintenance of the status quo with respect to the continuation of farming in marginal areas, and more particularly the preservation of extensive grazing systems, therefore contributing to the conservation of traditional rural landscapes, avoiding land abandonment and the disappearance of these landscapes. Moreover, the necessity to comply with good agricultural and environmental standards in order to receive the full decoupled direct payment, and the implementation of agri-environmental payment schemes to encourage farmers to carry out agricultural activities favourable to the maintenance of the countryside, has positively influenced landscape provision.

What cannot be assessed from this report is how rural landscapes would have changed in the absence of the CAP. Moreover, most major changes in European agricultural landscapes, through large-scale land use conversions, have not occurred during the lifetime of the CAP, but prior to its implementation (Rounsevell, Audsley et al.). This does not mean, however, that the past, present and future CAP has no significant influence on landscape. By providing a list of the potential influences of the CAP on the landscape elements and structures valued by EU citizens, **this report provides a knowledge base to support an effective CAP design in the direction of improved landscape management.**

It is also appropriate to recognise some of the limits of the exercise. A more complete exercise will permit the acquisition of adequate knowledge about: what the agricultural landscape contains and means to us, how it has evolved over time and what drove this evolution, what we want the landscape to be like, and how to achieve the objectives we set for the landscape and its development in the future (Gaukstad and Sønstebo 2003). The output of the Framework Project CLAIM will provide further answers to this set of questions. CLAIM is a research project funded by the Seventh Research Framework Programme (FP7) of the European Commission (2012-2015).²³ The CLAIM project aims to provide a suitable knowledge base to support an effective CAP design in the direction of improved landscape management, particularly providing insights into the ability of landscape to contribute to the production of added value for society in rural areas. The CLAIM project is particularly focused on understanding and enhancing the contribution of landscape management to socio-economic development and agricultural competitiveness in rural areas.

The report is not able to provide a strict answer to the question of the optimal level of governance for landscape protection. Landscape-targeted measures of the CAP are mostly financed by the European budget through pillar II Axis 2. Whether Member States should contribute more to the funding of pillar II is a question outside the scope of this report. Agri-environmental measures targeting landscape conservation in regional or national RDPs seem to be the best instrument due to the local nature of the landscape public good. Nevertheless, we recommend including landscape considerations in the redesign of direct payments. Indeed, the report provides some evidence that the pillar I criteria for farmers to be eligible for direct payments can have non-negligible influences on landscapes (through the definition of the eligible area and the cross compliance requirements). A more formal assessment of the potential influence of greening on landscapes will be a useful first step towards this goal.

The signature by the European Commission of the European Landscape Convention could provide an impetus towards the integration of the effect on landscape in the policies. The convention aims to encourage public authorities to adopt policies and measures at local, regional, national and international levels for protecting, managing and planning landscapes throughout Europe. The ELC requires Parties to carry out research and studies in order to identify landscapes and analyse their characteristics and the dynamics and pressures that affect them. The convention was adopted on 20 October 2000 in Florence (Italy) and came into force on 1 March 2004 (Council of Europe 2000). It has been signed by 37 of the 47 Member States of the Council of Europe. It is open to all European countries (EU Member States and others), as well as the European Commission itself, but the EC has not signed it yet.

In order to quantitatively evaluate the impact of the changes in agricultural practices and land use on landscapes, it is necessary to have access to landscape indicators. They will be necessary to monitor and manage the quality and diversity of European landscapes. One issue is that the complexity and multiple functions of European landscapes cannot be easily captured by a single indicator. Paracchini et al. (2011) propose an indicator for landscape state and diversity structured in three components, each describing a very different aspect of the rural-agrarian landscape. It takes into account: the physical structure, intended as land cover and its spatial organisation as a product of land management; the degree of naturalness as a proxy for the influence exerted by farming practices on nature; the societal awareness of the landscape, as the society perceives, assesses and values landscape quality, plans, manages, and uses the landscape for productive or non-productive purposes. This indicator is included in the set of 28 agri-environmental indicators (AEI) adopted by the European Commission in order to track the integration of environmental concerns into the CAP

²³ <http://www.claimproject.eu/about.aspx>

(Communication "Development of agri-environmental indicators for monitoring the integration of environmental concerns into the common agricultural policy" (COM(2006) 508 final)).

Landscape objectives tend to be defined in the CAP in terms of conservation, in a defensive manner. A management action is considered as contributing towards landscape if *"it maintains or protects individual landscape elements or the characteristic structure of a more traditional agricultural landscape as a whole"* (Institute for European Environmental Policy 2011). However, one difficulty with landscape policies intended to conserve historically dated landscape relates to the impossibility to restore the economical and social conditions prevalent at the time of reference (Van Haaren, 2007). In the absence of these conditions, there is a risk that these "conservation" policies will not achieve their objectives. It is useful to remember the experiences of important periods of history, during which the issue of landscape was central to society's thinking on the "agricultural project" (Amboise 2004).²⁴ The agricultural landscapes we want to protect today are the result of the projects implemented at that time. The same logic should apply now: the EU project towards a more sustainable agriculture cannot avoid taking into account space/landscape dimensions, and therefore should include a landscape project.

²⁴ In 14th century Italy, artists and agronomists worked together on the concept of "beautiful landscape", which became part of the agricultural project of the Italian society (see for example the influence of the series of frescoes painted by Ambrogio Lorenzetti in 1339 "The Allegory of Good and Bad Government"). In 17th century France, Olivier de Serres claimed that agriculture is the first art and work on how to promote a sustainable agriculture. Thanks to this project, France is nowadays often considered the "garden of Europe" whereas rural landscapes were in a deplorable state upon the eve of the Revolution in 1789.

Annex: Relations between landscape structure/features and landscape functions

The main functions or services provided by landscapes can be classified in four categories: provisioning, regulating, cultural and amenity, habitat supporting (TEEB 2010) (Figure 13). Table 8 summarizes the available literature on how the different landscape structures and elements can provide those ecosystem services.

Figure 13: List of the ecosystem services, classified in four categories

Provisioning Services are ecosystem services that describe the material outputs from ecosystems. They include food, water and other resources.	
	Food: Ecosystems provide the conditions for growing food – in wild habitats and in managed agro-ecosystems.
	Raw materials: Ecosystems provide a great diversity of materials for construction and fuel.
	Fresh water: Ecosystems provide surface and groundwater.
	Medicinal resources: Many plants are used as traditional medicines and as input for the pharmaceutical industry.
Regulating Services are the services that ecosystems provide by acting as regulators eg regulating the quality of air and soil or by providing flood and disease control.	
	Local climate and air quality regulation: Trees provide shade and remove pollutants from the atmosphere. Forests influence rainfall.
	Carbon sequestration and storage: As trees and plants grow, they remove carbon dioxide from the atmosphere and effectively lock it away in their tissues.
	Moderation of extreme events: Ecosystems and living organisms create buffers against natural hazards such as floods, storms, and landslides.
	Waste-water treatment: Micro-organisms in soil and in wetlands decompose human and animal waste, as well as many pollutants.
	Erosion prevention and maintenance of soil fertility: Soil erosion is a key factor in the process of land degradation and desertification.
	Pollination: Some 87 out of the 115 leading global food crops depend upon animal pollination including important cash crops such as cocoa and coffee.
	Biological control: Ecosystems are important for regulating pests and vector borne diseases.
Habitat or Supporting Services underpin almost all other services. Ecosystems provide living spaces for plants or animals; they also maintain a diversity of different breeds of plants and animals.	
	Habitats for species: Habitats provide everything that an individual plant or animal needs to survive. Migratory species need habitats along their migrating routes.
	Maintenance of genetic diversity: Genetic diversity distinguishes different breeds or races, providing the basis for locally well-adapted cultivars and a gene pool for further developing commercial crops and livestock.
Cultural Services include the non-material benefits people obtain from contact with ecosystems. They include aesthetic, spiritual and psychological benefits.	
	Recreation and mental and physical health: The role of natural landscapes and urban green space for maintaining mental and physical health is increasingly being recognized.
	Tourism: Nature tourism provides considerable economic benefits and is a vital source of income for many countries.
	Aesthetic appreciation and inspiration for culture, art and design: Language, knowledge and appreciation of the natural environment have been intimately related throughout human history.
	Spiritual experience and sense of place: Nature is a common element of all major religions; natural landscapes also form local identity and sense of belonging.

Icons designed by Jan Sasse for TEEB. They are available for download at www.teebweb.org

Table 8: The ecosystem services provided by landscapes' elements and structures

	Ecosystem services	Reference + Description
Landscape Elements		
Ditches	(a) provisioning	Biomass for feed and energy (Herzon & Helenius, 2008);
	(b) regulating	Acceleration of transfer of water and soluble nutrients from the field, water retention and nutrient recycling within the ditches, uptake and release of phosphorus and nitrogen by vegetation, mitigation of herbicides in vegetation and sediments, supporting pollination and pest control services, modifying erosion rate en transfer of soil-bound nutrients (Herzon & Helenius, 2008);
	(c) cultural & amenity	Amenity values through support by residents and farmers (Herzon & Helenius, 2008);
	(d) habitat or supporting	
Tree lines/ agro forestry/ woody elements	(a) provisioning	Wood provision
	(b) regulating	Enhance soil fertility, reduce erosion, improve water quality, sequester carbon (Jose, 2009); Runoff filtration, (Latterra, Orúe, & Booman, 2011); Fine dust capture (van Oudenhoven, Petz, Alkemade, Hein, & de Groot, 2012)
	(c) cultural & amenity	Increase aesthetic value, (Jose, 2009); increased recreational value (van Oudenhoven et al., 2012)
	(d) habitat or supporting	
Hedgerows	(a) provisioning	Firewood production (Burel, 1995)
	(b) regulating	Reduced erosion and runoff (Alison G Power, 2010)(Burel, 1995); Reduced wind erosion by windbreak effect (Burel, 1995); decreased wind and water erosion and water filtration (Stoate, 2001);
	(c) cultural & amenity	Increased landscape value (Burel, 1995)
	(d) habitat or supporting	
Field margins	(a) provisioning	
	(b) regulating	Pest control, reduced erosion, reduced eutrophication and pollution, enhancing crop pollinator populations (Marshall & Moonen, 2002);
	(c) cultural & amenity	Increased access for recreation purposes, increase aesthetic value (Marshall & Moonen, 2002);
	(d) habitat or supporting	Promotion of game species, promotion of ecological stability in crops (Marshall & Moonen, 2002);
Ponds	(a) provisioning	
	(b) regulating	Pest control (Herzon & Helenius, 2008)
	(c) cultural & amenity	
	(d) habitat or supporting	Habitat function (Herzon & Helenius, 2008)
Field Management	(a) provisioning	Harvestable crops
	(b) regulating	Soil fertility (A. G. Power, 2010; Pretty, 2008)
	(c) cultural &	Crop amenities, Livestock amenities

	<i>amenity</i>	
	<i>(d) habitat or supporting</i>	
Stonewalls	<i>(a) provisioning</i>	
	<i>(b) regulating</i>	
	<i>(c) cultural & amenity</i>	Stated preference for stone walls (Campbell, 2007)
	<i>(d) habitat or supporting</i>	
Terraces	<i>(a) provisioning</i>	
	<i>(b) regulating</i>	
	<i>(c) cultural & amenity</i>	Stated preference for terrace landscape (Arnberger & Eder, 2011)
	<i>(d) habitat or supporting</i>	
Landscape Structure		
Land use management		
Fragmentation	<i>(a) provisioning</i>	
	<i>(b) regulating</i>	
	<i>(c) cultural & amenity</i>	Stated preferences for (un)fragmented landscape (Brander, 2011)(Jongman, 2002)
	<i>(d) habitat supporting</i>	Habitat services (Brander, 2011; Jongman, 2002)
Field Size	<i>(a) provisioning</i>	Output of commodities
	<i>(b) regulating</i>	
	<i>(c) cultural & amenity</i>	Stated preference for field sizes (Hunziker & Kienast, 1999; Tempesta, 2010)
	<i>(d) habitat supporting</i>	
Landscape Diversity	<i>(a) provisioning</i>	
	<i>(b) regulating</i>	
	<i>(c) cultural & amenity</i>	Stated preference for landscape diversity (Hunziker & Kienast, 1999; Tempesta, 2010)
	<i>(d) habitat supporting</i>	
Biophysical characteristics		
Elevation/slopes	<i>(b) regulating</i>	
	<i>(c) cultural & amenity</i>	Stated preferences for sloped landscapes (Arnberger & Eder, 2011)
	<i>(d) habitat supporting</i>	
	<i>(a) provisioning</i>	

Source: (Van Zanten and Verburg 2012)

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Abstract

Agriculture is both a large-scale user of land and a provider of landscapes. The adaptation of agricultural practices to local conditions has led to a wide variety of "cultural landscapes" in Europe. The Common Agricultural Policy is a major driver of land use and changes in farming practices in Europe, and thus also affects landscapes. The report analyzes how the CAP's design and implementation have influenced agricultural landscapes. It provides a catalogue of the CAP measures that have been put in place and are currently influencing landscapes, as well as the expected effects derived from the proposal for the post-2013 CAP. It differentiates between pillar 1 and pillar 2, and between measures with a direct focus on landscapes vs. non-targeted measures which also have the potential to influence landscapes (positively or negatively). The olive and livestock sectors, where the influence of the CAP on landscape is of particular interest, are also analyzed. By providing a list of the potential influences of the CAP on the landscape elements and structures valued by EU citizens, this report provides a knowledge base to support an effective CAP policy design in the direction of improved landscape management, an important component of the EU project towards a more sustainable agriculture.

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